APRIL, 1955

Products finishing

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Finishes on *Metal* Products

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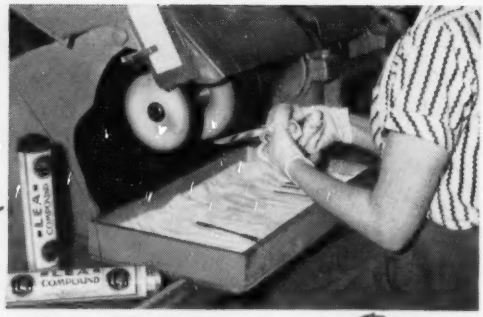

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Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

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PRODUCTS FINISHING
APRIL, 1955

Page No.	Name of Manufacturer	Page No.	Name of Manufacturer

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CITY_____ ZONE____ STATE_____

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Your Monthly Source For Finishing Ideas

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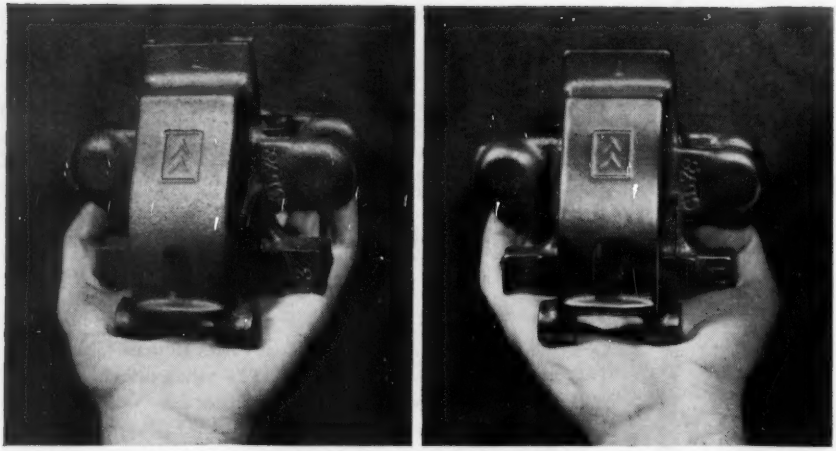

Identical castings, before and after barrel finishing with Norton ALUNDUM abrasive. Completely finishing this irregularly shaped part by hand would have taken much longer, with less uniform finishing of the many hard-to-reach spots.

ALUNDUM* tumbling abrasive tames another tough one!

Intricate parts finished faster, more thoroughly, when Norton abrasive adds the "TOUCH of GOLD"

The trickier, more intricate the parts, the easier it is to see the many advantages of barrel finishing with ALUNDUM tumbling abrasive. Hand finishing the casting illustrated, for example, would have been a long, tiresome chore — and an uneven job at best, due to the many irregularities of shape.

For parts ranging from even heftier castings down to tiny needles, there's nothing like ALUNDUM abrasive to bring out *all* the benefits of barrel finishing. This typical Norton abrasive development is sharp, dense, hard and non-fracturing. Its blocky shape eliminates slivers and chips in the tumbling process. In your tumbling barrels it assures:

- *Highest uniformity of radii and surfaces, with brightest, smoothest finish.*
- *Continual savings of man-hours, by reducing tumbling cycles, scrap and reworking to minimum.*

See Your Norton Distributor

for further facts on how ALUNDUM abrasive can add the time-saving, profit-boosting "Touch of Gold" to your finishing operations. Ask him for the new 55-page booklet on barrel finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G 288

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VOLUME 19 NUMBER 7 APRIL, 1955

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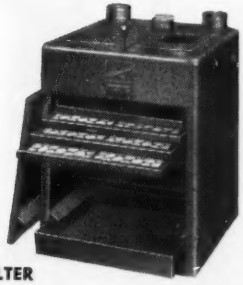

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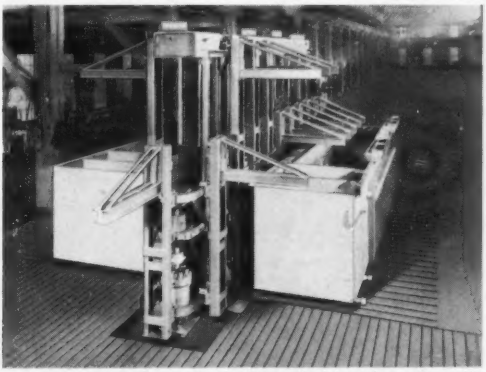
"FROM THE CASTING OR STAMPING TO THE FINAL FINISH"

ANNOUNCING THE "STEVADOER"—A HEAVY-DUTY AUTOMATIC PLATING AND PROCESSING MACHINE

751st Machine by Stevens Designed for Single or Double Row and Automation

After three years of design, development and testing Frederic B. Stevens Inc. is proud to introduce to the metal finishing industry its new heavy-duty plating and processing machine—the "Stevadoer." This new machine has been built to complement the Stevens A and B Model Rack Type machines and the famous Stevens Model C and Super E Automatic Barrels. With the new "Stevadoer"—now more than ever, Frederic B. Stevens, Inc. lives up to its program of "Everything for Metal Finishing."



Load end view of the new Stevens "Stevadoer," automatic plating and processing machine.

When the "Stevadoer" first went to the drawing board the management directive called for unlimited lift, heavy load capacity, increased flexibility and versatile design to meet tomorrow's requirements of higher production—all of which have been incorporated in this outstanding new machine.

Take a look at the new Stevens "Stevadoer" and you will know that here is one of the most ruggedly built, compact metal finishing machines ever built. It will take almost unlimited rack sizes and will lift extreme weights. It has a high lift yet is designed to take up a minimum amount of height and floor space as compared to competitive machines of similar capacity.

As has always been true of all Stevens machines, the "Stevadoer" has great mechanical flexibility. The Stevens-pioneered delayed set-down mechanism which provides independent timing in one or more tanks is, of course, a part of the design. Then, there is a timer control which permits a carrier arm to skip any particular tank or operation if desired.

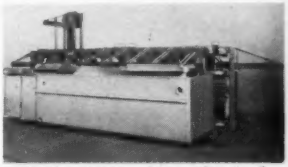
Smoothness of operation is another outstanding feature of the "Stevadoer." All lift and horizontal motion is accomplished by hydraulic power. Special controls permit independent adjustment of acceleration and transfer speeds to accommodate all extremes of weight and rack size.

The side arm design of the "Stevadoer" eliminates all moving mechanism over the solutions, and all internal mechanisms are installed below tank level. These features eliminate the possibility of contamination of processing solutions resulting from lubrication material, hydraulic oils and metallic wear. This design also reduces to a minimum the exposure of critical moving parts to the corrosive atmosphere of acid, alkalies and water vapor.

Safety requirements are built into the machine in that a 20-inch cat walk or wider can be easily provided between the processing tanks and the mechanism on two-row machines. This is, of course, extremely helpful in removal of anodes, inspection and maintenance without the hazard of working over hot processing tanks.

Access space for anode service and safety—a feature of the new Stevens "Stevadoer."

With the automatic loader and unloader the "Stevadoer" becomes the last word in automation. Racks are brought to the machine by overhead conveyor from polishing and buffing departments and automatically loaded without the use of manpower. After plating or other metal finishing processes have been completed the racks are automatically removed from the machine and rerouted to the proper department by the conveyor. Only one man is required to supervise the operation of the big capacity "Stevadoer."



Side view of the new Stevens "Stevadoer," plating and processing machine.

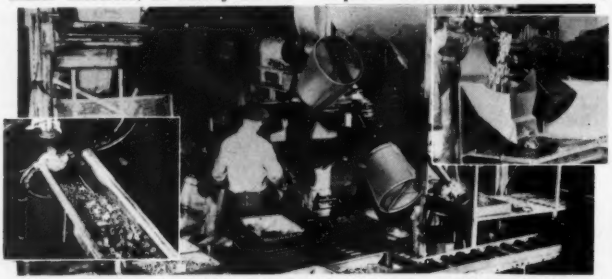
Frederic B. Stevens has more than 35 years experience in designing and building plating and processing equipment. If you are interested in high performance at low cost in metal finishing, check with Stevens, who can furnish you with the right machine for the job.

STEVENS *Slants* ON METAL FINISHING

ONLY STEVENS HAS FULLY AUTOMATIC BARREL—NO BARREL LIDS TO REMOVE FOR LOADING OR UNLOADING

Complete automation in small parts plating can be accomplished with a Stevens Automatic Barrel Plating Machine since the open end barrels permit mechanical loading and unloading of small parts without the need for manpower. In automatic barrel machines using horizontal cylinders it is necessary for workmen to remove the cylinder lids for loading and unloading. Stevens machines therefore, fit ideally into a fully automated factory production line.

The time tested Stevens Automatic Barrel Machines are noted for their economy, plating performance and simplicity. In fact, more Stevens Automatic Barrel Machines have been sold than all other makes combined. A few of the other many features are: Uniformity of plate, minimum of labor, less rejects, no mixing of parts and low maintenance costs.



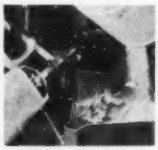
Roller conveyors bring small parts to Stevens Automatic Barrel machine for processing. **Lower Left:** Open end of barrel cylinder permits automatic loading. **Upper Right:** Up position of barrel, cylinder unloads by gravity.

USERS ACCLAIM STEVENS AUTOMATIC BARREL MACHINE

Users everywhere praise the Stevens Automatic Barrel. For example—

The Maytag Company in Newton, Iowa, says—"*Quality improved 70%. Our Stevens Machines give a substantial savings in manpower and require little maintenance.*"

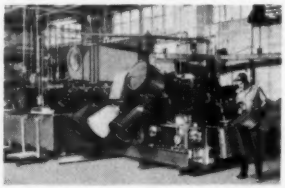
Daisy Manufacturing Company, Plymouth, Michigan—"*Bringing new profits and efficiency to our operation which requires a copper coating of shot pellets.*"



After copper coating at Daisy Mfg. Co. shot is dumped by the revolving barrel.

Thousands of small parts are zinc plated at the Unistrut Corporation plant at Wayne, Michigan. They report—"*Less handling, quicker shipments, smaller inventories plus a 50% plating cost reduction.*"

Homer A. Doerr & Son, St. Louis, Missouri, a thirty-year-old job plating firm, says—"*Gives us more uniform results, to closer tolerances, at higher production by far than with equipment formerly used.*"



A diversified group of parts is plated daily by this Stevens Automatic Barrel Machine.

The report of the Schlage Lock Company of San Francisco, California, is—"*We get a more durable finish . . . better results . . . with our Stevens Automatic Barrel plating installation.*" These are but a few comments from hundreds of satisfied users.

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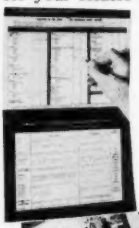

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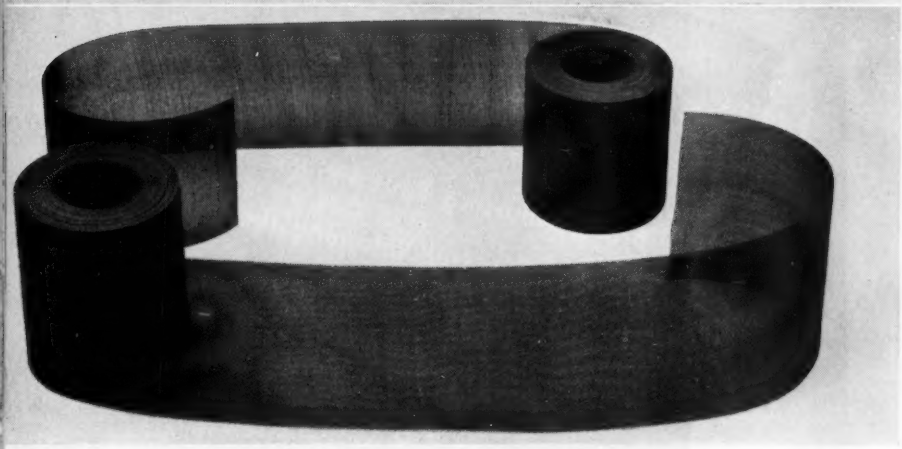

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New Freer Sanding — Faster Drying

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Brings Amazing Finishing-Room Economies

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• DURABILITY • ADHESION • APPEARANCE

• IMPACT RESISTANCE

of Slower Drying Systems

*Facts from
Egyptian New Product
Field Report

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SPRAY, BRUSH OR GLAZE* New Egyptian 700 Glaze can be sprayed, brushed or glazed with equally fine results, bringing a high degree of versatility to your finishing room equipment.

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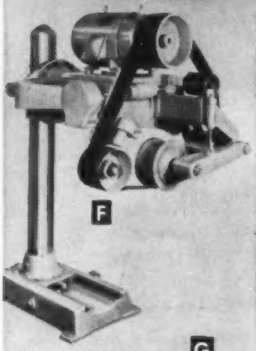
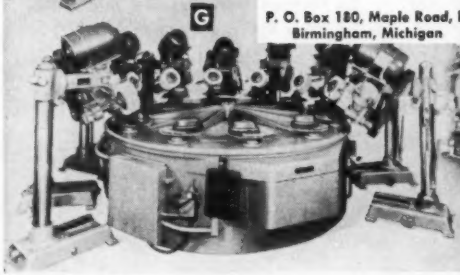


A. Micro-Polish—Continuous Strip Polishing Installation
B. Vertical-Platen Conveyor
C. Horizontal-Platen Conveyor
D. #51 Universal Polishing Head —One of Several Standard Polishing Heads
E. The Automatic, Self-Cleaning, Compact Filter
F. #72 Series Belt Polishing Head
G. Indexing Dial Table
H. Six Micro-Polish Units in Series



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STUDEBAKER gets a better, more uniform, paint job on chassis as production is increased and finishing costs are cut substantially with

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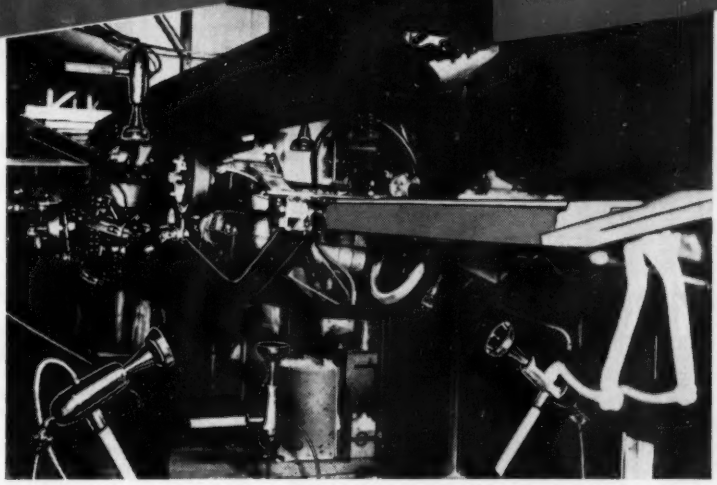

● When Studebaker Division, Studebaker-Packard Corporation switched to Ransburg No. 2 Process of Electrostatic Spray painting on their automobile chassis, paint mileage was increased 9 times.

By simply putting the paint where it's supposed to go, Studebaker cut daily paint consumption on the chassis production line from 14½ drums to 1½ drums. And, still they are painting 6 more chassis per hour with the No. 2 Process.

In addition to getting better, more uniform coverage with the asphalt-type coating, paint and labor costs were cut 70¢ per chassis. In eliminating the former set-up with 2 water wash booths and 12 automatic spray guns, they save nearly 1000 square feet of badly needed floor space.

Another on-the-job-example of the unmatched efficiency of the Ransburg No. 2 Process in which quality of the work is improved . . . AT LESS COST!

* *Studebaker also uses the Ransburg method to apply a heavier and more uniform primer surfacer on automobile bodies.*

Whatever your product—large or small—if your production justifies conveyorized painting, it's possible that one of the Ransburg electrostatic processes can do the job better, with substantial savings to you. We'll be glad to tell you about complete Ransburg services. Write to Dept. P.

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Maximum Rust Protection

and a fine black finish for iron and steel

This long-wearing, rust resistant product is used on many types of iron and steel articles: Nuts and bolts, brackets, screws, nails, springs; tools, casters, padlocks, machine housings and castings; outdoor furniture, hinges, latches, ornamental iron.

Parco Compound is a versatile metal treatment. It is simple to operate, easy to control, dependable and uniform in results, and economical. It creates a dense coating of nonmetallic phosphate crystals over the whole surface of the article treated. There are no limitations on size or shape—any article which can be immersed in the tank can have this protection. Oil, wax, stain, or paint finishes may be used over Parco Compound, to produce maximum rust resistance with deep, velvet black appearance.

Since 1915—leader in the field

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PARCO COMPOUND — rust resistant

PARCO LUBRITE — wear resistant for friction surfaces

BONDERITE — corrosion resistant paint base

BONDERITE and BONDERLUBE — aids in cold forming of metals

TROPICAL — heavy duty maintenance paints since 1883

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It's easy to apply! New Hamm-Ore-Flex with Nacromer is ready-mixed for spray application. It is available in Air Dry or Baking finishes custom formulated to user's schedules.

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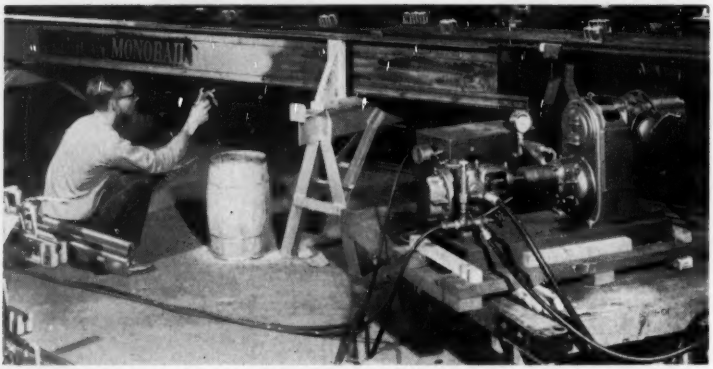

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PRACTICAL?

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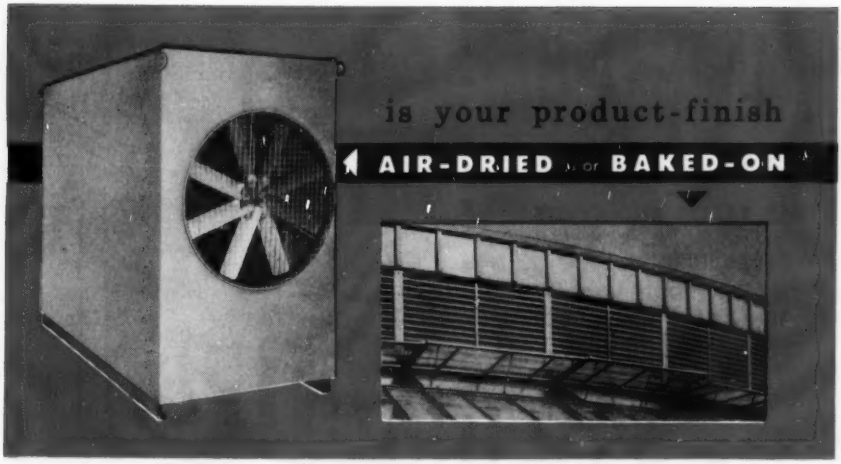

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CAN HELP YOU GET A BETTER FINISH . . . FAST

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WRITE FOR DESCRIPTIVE BULLETIN

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BAKED-ON: Vinsynite undercoat provides maximum adhesion for baked enamel topcoats on these ventilating louvers of steel, aluminum, copper and brass, made by The Airolite Co., Marietta, Ohio.

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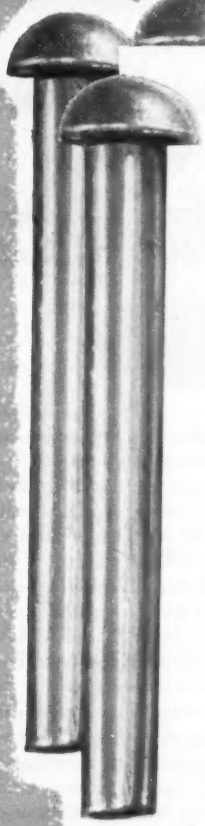

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Promat B 4 or B 4M brighteners are effective, economical addition agents for bright "out of bath" requirements on barrel, still, semi and full automatic work.

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Pf editorial

Vol. 19, No. 7

APRIL, 1955

What's Your PR Q?

PR Q is a short way of saying Public Relations Quotient. And Public Relations Quotient is an expression which may be used to indicate the work you are doing (or not doing) to improve the standing of your company and the Finishing Industry in the eyes and mind of the general public. Just remember that the general public consists of your personal friends, neighbors, customers, and the people that you meet in your day-to-day contacts. So what you, as an individual, say and do to create ideas about finishes and finishing methods, adds up to a big impression.

Trade associations, technical and scientific societies, and industry publications are doing a great deal to publicize the importance of proper specification and application of various finishes to the products being manufactured today. Also, it should be noted, manufacturers are stressing the importance of finishes in advertising of various consumer products; for example, stressing the electropolished points on fountain pens, and the finishes applied to washers and dryers.

This fine example should be furthered by each one of us in the Finishing Industry. It goes without saying that we are doing our best to help produce attractive and durable finishes on today's products—that is the No. 1 public relations job. But a great deal more can be done in other directions. One example of excellent industry publicity concerning a company in the electroplating business is cited on Page 138 of this issue.

None of us can do enough to spread information about the properties, uses, and application of high quality finishes. The more that purchasers of finished products and buyers of finished parts or sub-assemblies know about how various kinds of finishes are applied, and what their characteristics are, the greater will be the standing of the Finishing Industry.

And as the Finishing Industry increases in stature and importance in the eyes of the general public, your position in that industry will become more important too.

Ezra A. Blount

—EDITOR

High Production Automatic

The requirement for painting metal stampings and castings in quantity is being met at K-D Lamp by a recently installed conveyorized dip painting and baking installation.

By GERARD H. POLL, JR.

EVER NOTICE how many reflectors and warning lights are used on the back of trucks traveling the highways at night? These signals are used to be sure the motorist approaching trucks from the rear in darkness is able to see the truck and its dimensions immediately. It is very likely that some of these safety devices you have seen were produced by the K-D Lamp Company. This Cincinnati company produces safety equipment and accessories for trucks and automobiles. Such things as stop lights, reflectors, headlights, fender lights, interior dome lights, and warning signals used by vehicles stalled on the highway are mass produced by K-D. Parts are designed and produced to the company's own specifications, so as to conform with Interstate Commerce Commission and individual state requirements for durability and performance.

Many of these parts are now being paint finished in a new conveyorized dipping and baking setup. Since most of the parts used in producing these items are iron castings and steel stampings, the system has been geared for high production finishing of such parts.

K-D Lamp has large volume requirements for finishing many of the stampings and castings, and finds it desirable to make long unbroken

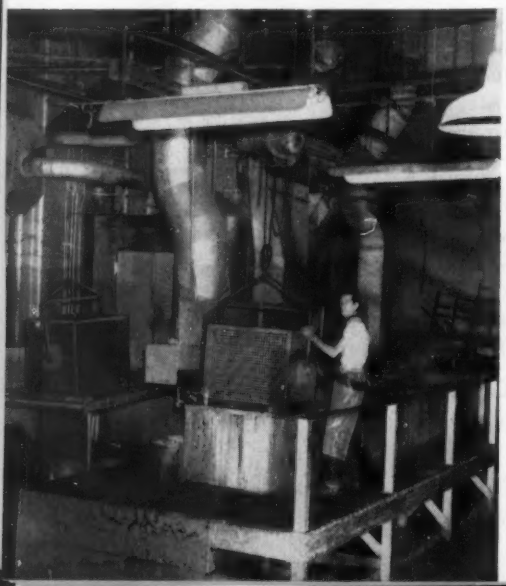

Fig. 1—A view of the cleaning and phosphatizing installation, showing one basket of parts being removed from an alkaline cleaner tank (center) and a completed basket of parts on the gravity roller conveyor after being discharged from the drying oven. Parts travel through the process in baskets which are transported by an oval overhead monorail conveyor, or by the gravity roller conveyor which carries them through the drying oven. Basket loading and basket unloading is done in the same area.
(PRODUCTS FINISHING staff photo).

Dip Finishing System

production runs on a single part. Thus, a primary consideration in designing this unit was to produce a system which would paint such articles as quickly as possible and at the same time produce a high quality finish. Other necessary features to be built into the system were: a conveyor that would adapt easily to the different sizes of parts produced; dip tanks that could be changed easily when colors of paint must be changed; a conveyor speed variable within limits to give high production as well as adequate baking times; an oven which would produce even heat throughout and be adjustable for different sizes of parts and various types of paint; safety precautions; and a dipping procedure that would allow for minimum dragout and complete coverage of articles being painted.

The design for the baking oven was the result of close cooperation between engineers of the Kirk & Blum Manufacturing Company and K-D Lamp Company. Much careful consideration was given to the size of the oven, so as to have economical operation and yet have fully adequate capacity. Placement of this unit in the building was also carefully planned, with efficiency in a minimum of space as the objective.

Metal Preparation

During fabrication, the steel parts become coated with a film of drawing compound or rust preventive oil. To remove all traces of such substances and prepare the surface of the metal for paint application, parts are sent through a 5-stage cleaning and phosphatizing cycle (Fig. 1). Steps in the immersion process are as follows:

1. Clean 10 minutes in a solution

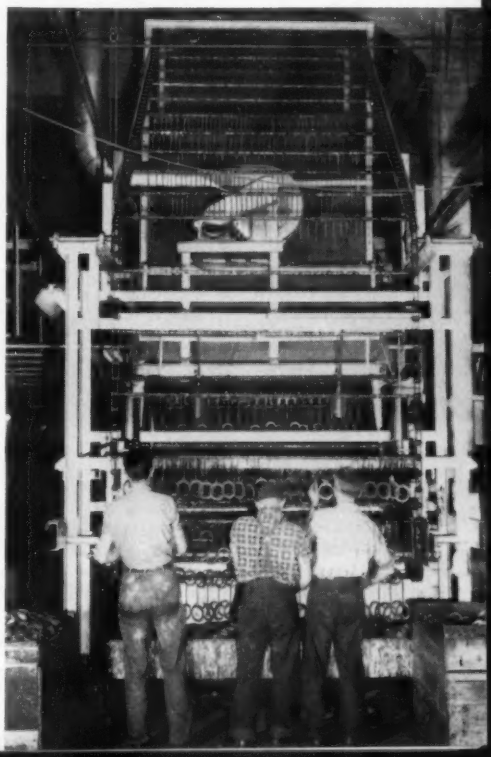

Fig. 2—A view of the loading station for the Kirk & Blum paint dipping and baking conveyor. As can be noted, parts are loaded from bins located directly in front of the conveyor path. Phosphatized parts in shop trucks are loaded on each side of the loading station so that there will be no interruption in loading, and so that the conveyor cross rods may be loaded to capacity at all times. (PRODUCTS FINISHING staff photo).

"Parts to be painted are attached to the continuous horizontal crossbar conveyor . . ."

of Parco cleaner at 200 deg. F. (2 cleaner tanks are used so that a cycle time of 5 minutes may be maintained).

2. Rinse in warm water.
3. Phosphatize for 5 minutes in a solution of Bonderite 160 held at 165 deg. F.
4. Rinse in warm water.
5. Rinse in Parcolene chromic-phosphoric acid solution.

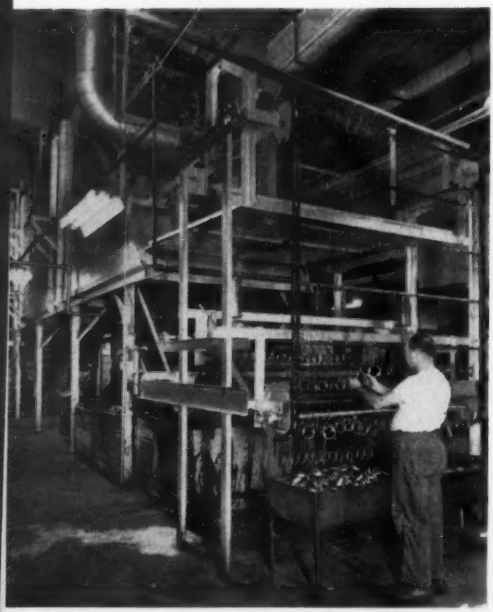

Fig. 3—Another view of the loading station for the paint dipping and baking machine. In this illustration can be seen also the baking oven located to the rear and above the paint dipping tank, the fume exhaust fan located just above the oven entrance and the three carbon dioxide fire extinguishers located above the paint dipping tank. (Photo courtesy Kirk & Blum Mfg. Co., Cincinnati, Ohio).

The phosphate coating tank is equipped with automatic temperature control; cleaning and rinsing tank temperatures are controlled manually. Articles being cleaned are transported through these stages in large steel baskets, which are lifted in and out of the various tanks by a motor-driven hoist which moves on an overhead monorail.

After the cleaning and phosphatizing steps, parts are dried in an oven located behind the cleaning tanks (Fig. 1). This oven is a Kirk & Blum gas-fired, convection recirculating air oven equipped with a Partlow temperature control. Baskets of phosphatized parts are placed on a gravity roller conveyor which transports them to and through the drying oven. The total cleaning and drying cycle consumes about 1 hour, parts emerging from it clean, dry, and protected by a phosphate coating, ready for painting. From the oven, parts are transferred to the loading station of the paint dipping conveyor in shop trucks equipped with swivel casters.

Painting

Parts to be painted are attached to the continuous horizontal cross bar conveyor of the paint finishing machine (Figs. 2 and 3), which takes them through the complete cycle of dip coating and baking. The horizontal crossbars of the conveyor are over 6 feet wide. Parts to be painted are racked on simple C-type hooks which are in turn hung on the horizontal crossbars of the con-

veyor. Hooks may be spaced on the cross rods by means of simple spring clamps so that the number of hooks on any one cross rod may be varied considerably. Hooks of several sizes are used, depending upon the size of the articles being painted. Crossbars are individually removable, and can be attached at intervals on the conveyor chains up to 16 inches apart, thus allowing for different sizes of parts. The speed of the conveyor is variable; normally the conveyor moves at about 3 feet per minute, so that about 1 hour is required for the complete paint finishing and baking operation. However, the conveyor speed can be varied to decrease the cycle time to 15 minutes, or increase it to as much as 1½ hours.

A complete cycle for the Kirk & Blum finishing conveyor is as outlined below:

1. Parts are racked on the paint dipping machine as the cross rod conveyor moves vertically down past the loading operator. In some cases, parts previously attached to hooks are hung on the conveyor; in other cases, parts are attached to hooks already suspended from the cross rods.

2. Parts travel around a sprocket wheel and then up at an angle for a short distance, and then move down, dipping into the paint tank (Fig. 4) as the conveyor passes around the bottom of the sprocket wheel.

3. Emerging from the paint tank, they move up over a bead removal wire (Fig. 5) into the oven, where they travel the length of the oven

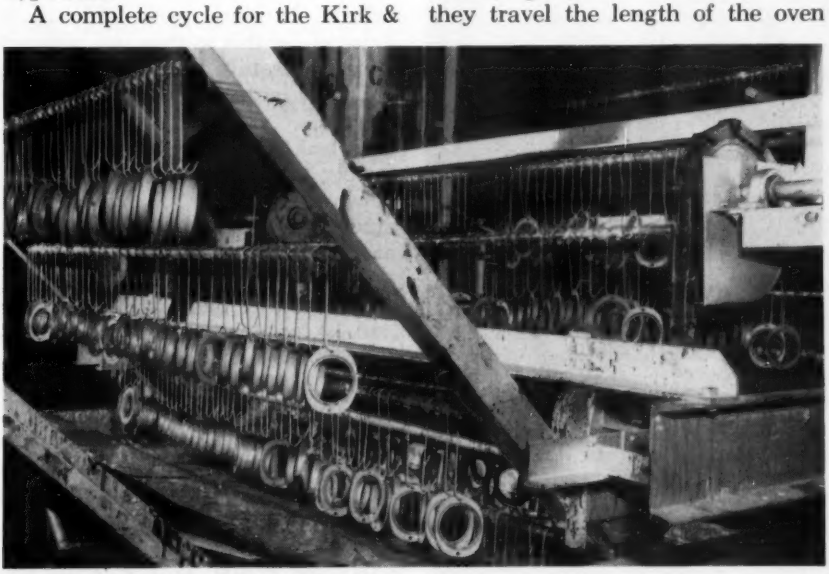

Fig. 4—Closeup view of the paint dipping tank showing 50 steel lamp rims, loaded on a single conveyor cross rod, being dipped simultaneously in Interchemical aluminum baking enamel. (PRODUCTS FINISHING staff photo).

"As the parts leave the dip tank, each row is drawn over a wire strung across the conveyor path . . ."

three times in a horizontal path, finally leaving the opposite end of the oven, where they are unloaded into bins (Fig. 6).

4. The conveyor then continues up over the top of the outside of the oven, and back to the loading station. Larger parts, requiring more curing time, are allowed to remain on the hooks while passing over the top of the oven. They are then unloaded at the loading station.

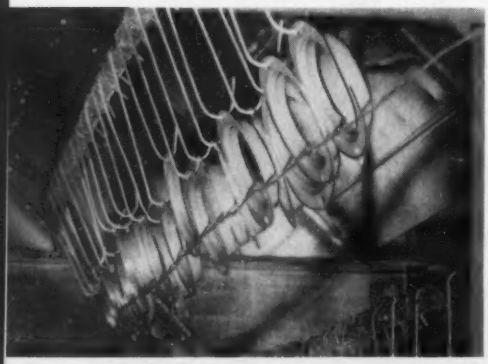

Fig. 5—Excess paint is removed and paint defects, such as beads, eliminated by the simple expedient of stretching a wire under the conveyor path at the correct height to tip the dip-painted objects slightly and at the same time scrape off the excess paint. (PRODUCTS FINISHING staff photo).

The dipping operation is well engineered. A recirculating pump keeps the paint agitated in the dipping tanks, and a dam overflow arrangement is used to keep the level of the paint constant. Paint is filtered constantly to keep it clean. Parts dip into the paint at such an angle as to cause the least turbulence and drag out the least amount of surplus paint. As the parts leave the dip tank, each row is drawn over a wire strung across the conveyor path parallel to the crossbar (Fig. 5). This tilts the parts, so as to drain off the excess paint, and "de-tears" them (removes the small droplets of paint which form on the lower edge). The success of the dipping operation is shown by the fact that even though parts are so close together that they overlap, no bare spots are evident on the finished product. Dip tanks are mounted on rollers to facilitate changing colors. Most parts finished by this system are painted with a gilsonite base black baking Japan or with an aluminum baking enamel.

The baking cycle takes approximately 22 minutes. The oven temperature is kept at 300 deg. F. when aluminum paint is being used, and at 425 deg. F. when the black Japan is used.

The baking oven is 30 feet long and 10 feet high. Little plant space is taken by this oven, since it is mounted 8 feet off the floor, to allow work space below. It is a direct, gas-fired recirculating type, with automatic temperature controls.

The heating chamber containing the gas burners is located on the side of the oven. Air is recirculated from the bottom of the oven, and fresh air is taken in near the burners and at the oven entrance and exit. An exhaust fan located near

the loading end of the oven is used to remove volatiles as the solvents evaporate from the freshly painted surfaces.

The oven is equipped with an automatically actuated carbon dioxide fire extinguishing system. Nozzles for discharge are located above the paint dipping area. The system may be manually triggered if the need arises, but is automatically discharged if the fire goes unnoticed.

Hooks for hanging the articles being painted on the crossbars of the conveyor must be cleaned periodically. This is necessary to remove paint which builds up after repeated cycles in the system. K-D uses an alkaline stripper for the aluminum paint, and burns off the other paints used. Stripping the hooks in alkaline solution is done by racking them on bars in a steel frame and immersing them in a solution of Detrex 68 alkaline cleaner. A concentration of 6 ounces per gallon of this material removes the paint very effectively. The frames or racks are handled by a motor operated overhead hoist, which lifts the racks in and out of the solution. They are allowed to remain in the solution for about 1 hour, and then removed, rinsed, and dried.

The dip finishing system at K-D Lamp Company can produce 6500 painted and baked pieces per hour. Appearance, uniformity, and coverage are excellent. The desired coating thickness can be obtained in one coat. Parts tested have passed a 96 hour salt spray test successfully. The system serves as an excellent example of the application of principles of mechanization to paint finishing of metal products.

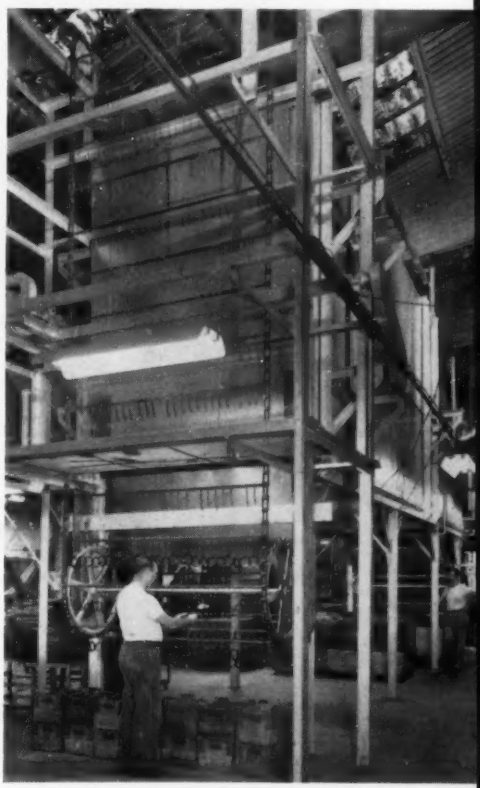

Fig. 6—Painted and baked parts emerge from the baking oven moving vertically downward and then around a sprocket wheel so that they may be unloaded into boxes and shop trucks as they pass vertically upward in front of the unloading operator. Parts enter the oven from below, and leave the oven through an opening located in the oven floor; therefore, the heat loss is held to a minimum. By locating a small exhaust fan near the entrance to the oven, solvent fumes are removed from the area where the concentration is highest. At the same time, the tendency for heated air to leave the oven through the discharge opening is minimized. (Photo courtesy Kirk & Blum Manufacturing Company, Cincinnati, Ohio).

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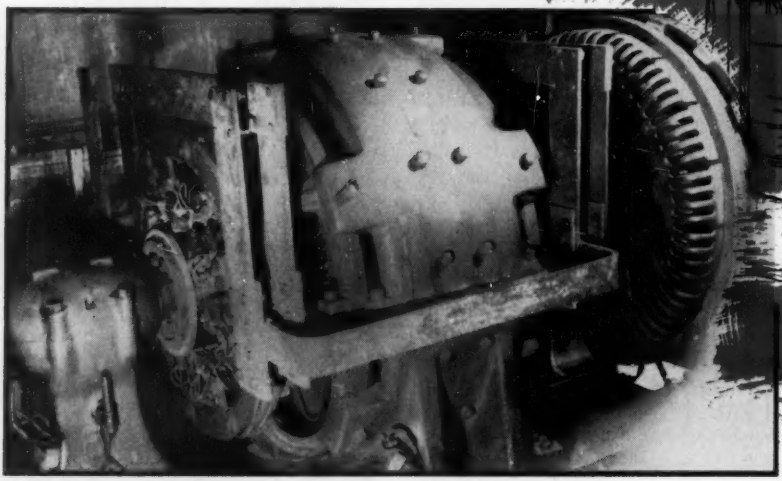

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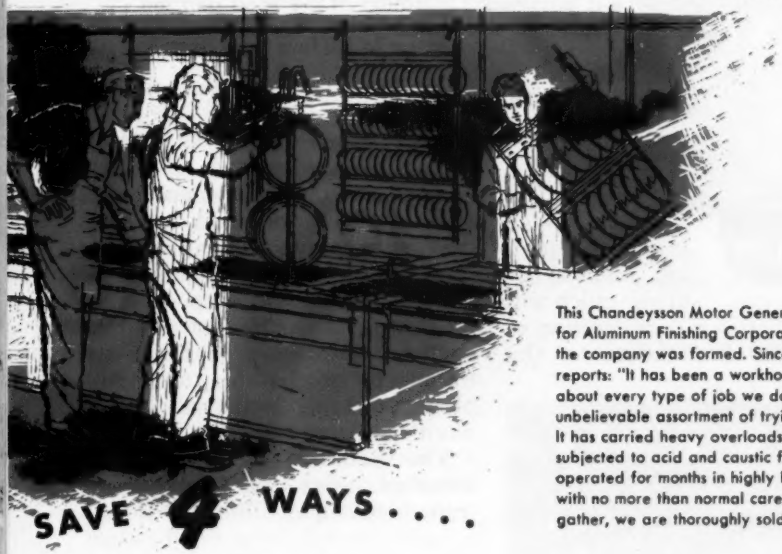

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1A-46

Chemical and Electrochem- Helps Control Job Plating

At Miller Electroplating, Inc., Evansville, Indiana, close control of electroplating processes is maintained by chemical and electrochemical methods plus the other usual controls. As a result, this progressive job plating shop knows exactly what each process costs, and can show each customer how the cost is distributed, and the quoted price is obtained. Operation of the shop and the control system is described in this article.

By EZRA A. BLOUNT
Editor

FEATURE

THE question asked most often in the job plating industry is "How much will it cost?" Cost is a consideration of almost equal importance to the supervisor of the plating department in a manufacturing plant, but he is not faced with the variation in quantity and size of objects to be plated as is the job shop operator. Neither is he confronted with the continual pressure either from customers or competitors to reduce plating costs as is the job plating plant manager.

The successful job plating shop, therefore, must not only install equipment and facilities so that plat-

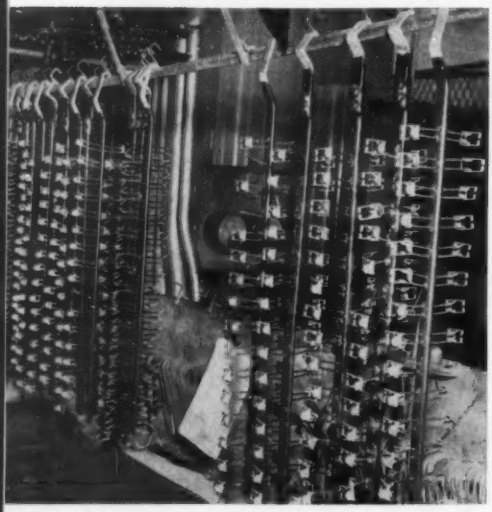

Fig. 1—A view of the racking area showing one group of standard plating racks on which a number of small parts have been racked for plating. The racks, supplied by Belke Mfg. Company of Chicago, are received with insulated splines. When contact positions have been determined, the racks are drilled with a drilling template and then countersunk through the insulation. Wires to serve as hangers for parts to be plated are then installed, tubing is forced over the wires and cemented at the point of contact with the circular spline to form a tight joint.

ical Accounting Plant

ing can be carried out in the most economical manner, but must also develop and put into practice a cost accounting and recording system that will keep accurate information as to the cost of each metal plated and of each kind and lot of parts.

Miller Electroplating, Inc. has devised an interesting and effective system for keeping production records into an effective method of determining processing costs. Parts to be plated are checked into the plant on a shipping order. A plating work order is then prepared on the lot in quadruplicate. One copy is directed to the master file, one copy to the accounting department, one copy to the control clerk (who coordinates scheduling and plant capacity), where it is filed according to the company and the kind of plating to be applied. The fourth copy is attached to the shipping ticket and remains there until the shipment is completed and leaves the plant. The plating work order may be a permanent order covering a contract from any one customer, or an individual order for each lot of parts. In the case of the blanket work order, a separate order is issued for each load received to simplify accounting for parts and materials.

The plating work order is filled out to indicate the kind of plating to be applied and the specified thickness. An itemized list of parts covered by the work order is noted on the order together with piece work prices, if they apply.

Paul E. Miller, founder and president of Miller Electroplating, Inc., photographed at the 1954 A. E. S. Convention, held in New York City.

Perhaps even more than the plating department supervisor in a large plant, the job plating shop manager must do everything possible to provide incentives not only for high quality work, but also for as efficient an operation as can be produced. Miller Electroplating has approached this problem by establishing what is known as a unit system.* The unit takes into account the amount of time which is involved in actual "time-on-the-job."

For example, a given number of

* For a more detailed description of the unit system, see "An Incentive Plan for Job Shop Plating" by Paul E. Miller, "Plating," January, 1949, page 56.

parts might require 24 minutes for racking, cleaning and placing into the plating bath, and later on, 7 minutes for removal, rinsing, drying and returning to the inspector or to the next operator concerned. Total time expended by the operator on this lot of parts would, therefore, be 31 minutes. Using the unit system, the operator would be credited with 31 earned units, a unit being defined as one minute of time used to perform the tasks outlined.

Indirect jobs which are vital to the successful operation of the plating plant include cleaning of rods and anodes, cleaning of tanks, maintenance and purification of solutions, moving loads of parts, and many other miscellaneous tasks. While these operations are necessary, it is difficult to estimate their cost and relationship to parts being processed if only elapsed time is considered in cost estimating. The use of the unit system provides the plant manager with more accurate information on the actual cost based on handling time, and at the same time, forms the basis for the incentive plan which encourages productivity and efficiency.

In the Miller plant, platers work as a group. One group might consist of ten platers. If the men are able to produce additional units over the established standard figure, those units are paid for on a percentage basis. This includes any necessary re-work. The platers are compensated on the basis of an hourly rate plus a bonus based on the number of "bonus" units produced. Therefore, not only the shop manager, but each employee knows whether or not operations are being conducted efficiently, and also knows the basis on which rewards for increased efficiency are being distributed.

A further standardization of operations has been achieved through the use of standard plating racks of uniform length and cross-section. Single spines are purchased, and when a new job is being estimated, the number of pieces which may be plated on each standard spine is determined and that is one of the factors in the cost quotation. When the new contract is obtained, then a number of plating rack spines are drilled and pins forced into the holes to produce a rack which will carry the number of parts previously determined and specified.

The number of plating racks or spines which a plater can carry at one time in moving from cleaning through rinsing to plating, and so on, is determined and that number of racks (and parts to be plated) is called a move. In estimating the piece work rate or the basis for bonus payments, so many minutes per move are allowed. The number of parts per move gives an accurate indication of the direct labor handling cost.

To provide additional information on the cost of plating, accurate records are maintained as to the use of material of all kinds, labor, racks, chemicals and so on, and applied to each time unit. These records are

summarized every three months to determine whether or not there is any basic increase or decrease in cost of these elements.

Polishing is a minor consideration in the Miller plant, although polishing and buffing facilities are installed. Cost of polishing and buffing is determined on a time basis (cost per minute of polishing time).

Cost of actual plating material such as zinc, cadmium, silver, copper and other metals is determined on an ampere-hour basis. Tanks are equipped with ampere-hour meters and these records, together with records of additions to each tank, make it possible to determine the actual value of materials used in plating each part.

In calculating in advance the number of ampere-hours for each tank load of parts, the total area to be plated is calculated and the time required to produce the specified thickness is determined. These calculations make it possible to determine the ampere-hour requirement for each load and to provide information which can be used to determine the cost of each metal per 100 pieces plated. The cost of each metal, chemical, anode, and so on, is charged against each tank as well as the parts being processed through that tank. Ampere-hour readings provide information on the cost per ampere-hour for operating that particular tank.

These determinations make it possible for the shop manager to show his customers and prospective customers the selling price of parts to be plated in various metals and various

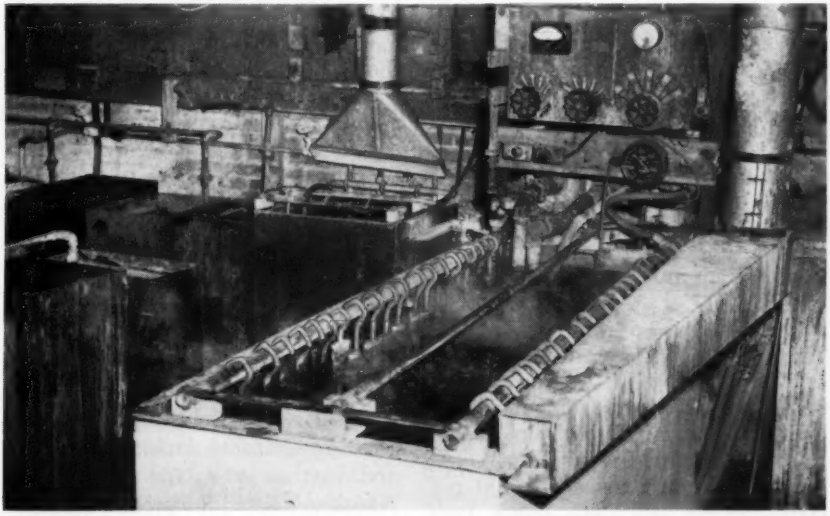

Fig. 2—A view of the Lea-Ronal bright copper plating solution in use at the Miller plant. Since this solution is operated at an elevated temperature, an exhaust duct is installed on one side of the tank to remove steam, vapor and fumes from the working area.

"Specialization has been cited as one important factor in the success of a job plating shop."

thicknesses. Selling prices are calculated in terms of cost per 0.001 inch thickness of metal per piece, and when the profit margin is added to that, a standard figure is obtained which makes it possible for the job shop owner to present his customer with a simple, reasonable basis for his price quotation.

All chemicals used in the plant are maintained on a perpetual inventory. The chemical laboratory issues addition orders for each tank based on analyses. These orders are checked by the plating foreman and turned over to the plater, who makes chemical additions on his own time. A permanent record of additions to each tank is maintained in the chemical control laboratory. Weekly corrections to the permanent stock record of the plant are made and additional chemicals and other materials are ordered each week or as needed to maintain a predetermined desirable stock level.

Time sheets which accompany the various loads of parts through the plating operation contain job numbers for purposes of identification, a count of the pieces to be plated, and a record of the units earned. These figures are posted against the original order with the piece count being verified by the final inspector and the shipping department. Some lots are inspected on a 10 per cent basis and others inspected 100 per cent, but in any case, every part must be accounted for.

Plating Facilities

Specialization has been cited as one important factor in the success of a job plating shop. Nowhere is this fact more evident than in the Miller plant. The Miller operation is designed for plating small parts, either on racks or in plating barrels as the size, complexity, or specification of the part requires. A few examples of the wide variety of finishes applied can be cited. For one customer, a small aluminum can is electrotin plated and then brightened in hot oil. Paint masks are manufactured by electroforming in an acid copper solution. This type of work was begun initially in 1939. Production plating of zinc die castings as well as of brass and steel parts, applying copper, nickel and chromium, or many of the precious metals is performed. In addition to the specialization on small parts, Miller Electroplating also has facilities for hard chrome plating of large shafts, axles, journals, and similar products.

A scaled plant layout in the plant superintendent's office presents a good picture of plant facilities, and serves as a basis for planning improved plant arrangement. The Miller plant is divided into a number of areas determined by the operations to be performed. One area contains facilities for polishing and buffing, another contains racking, cleaning and plating areas for small parts. Another is fitted for processing parts in plating barrels. In other areas of the plant, hard chrome plating is performed in a special installation,

and still another area is devoted to the plating of precious metals on small parts either on specially designed racks or in plating barrels. In all cases, an efficient oval area layout is employed so that economical handling is effected.

Small parts which are to be plated on racks are brought into the racking area (a view of which is shown in Fig. 1) and placed on the proper racks for that particular part. As can be anticipated, a large stock of racks must be maintained by job plating shops even though every effort is made to standardize.

Racked parts are then processed through the proper cleaning solutions (either soak or electrolytic) and, if bright copper is the first operation to be performed, parts are placed in the Lea-Ronal bright copper solution shown in Fig. 2. This solution is maintained at 150 deg. F. by automatic temperature control. This tank, like many other tanks in the Miller plant, is fitted with an automatic solution level control which was designed by Paul E. Miller and described in the September 1953 issue of PRODUCTS FINISHING. The bright copper tank is steel, lined with glass. The solution is recirculated and filtered six times per hour through a Fulflo filter, and then returned to the tank through a diagonal perforated pipe along the tank bottom. This tank, like other hot solutions in the Miller plant, is heated by steam, and in accordance with good practice, condensate is not returned to the boiler. A Sarco Thermoton installed on the condensate pipe holds back condensate until it cools to a predetermined temperature, thus maintaining top efficiency in the use of steam.

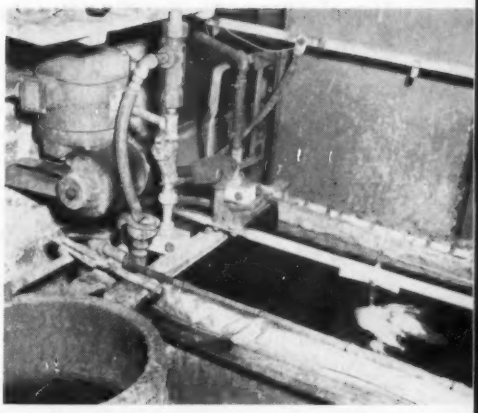

Fig. 3—A view of one corner of the Udylite bright nickel tank showing, immediately to the left, the concentration rinse used in connection with the nickel solution. Details of the cathode rod agitator and Sarco Thermoton installed on the condensate line and draining into the automatic solution level control, can be seen in the left foreground of the photo.

The next step in the plating process for parts receiving the conventional copper-nickel-chromium finish is processing through the Udylite bright nickel tank, a view of which is shown in Fig. 3. Interesting features of this installation include the use of a plastic screen bag which is the size of the tank and which is inserted in the tank (as can be noted in the illustration), between the anodes and the parts being plated. At the end of each shift this light plastic bag can be raised out of the solution and any small parts which have dropped off racks may be removed from the bag. This feature prevents zinc die castings from remaining in the solution for a long time and dissolving to contaminate the bright nickel solution.

Chemical and Electrochemical Accounting Helps Control Job Plating Plant

As can be noted in the illustration, a work rod agitator is installed on this tank as well as an automatic solution level control and a Sarco Thermoton on the condensate line. Parts processed through the bright nickel tank are taken through a concentration rinse prior to final rinsing to conserve the nickel solution.

Nickel plated parts are thoroughly rinsed and chromium plated in a solution containing 54 oz./gal. of chromic acid with a sulfate ratio of 90 to 1, and operated at 131 deg. F. The solution composition is kept uniform by slight air agitation.

After the plating cycle has been completed, racks of parts are removed from the chromium plating solution, taken through a concentration rinse, then unracked by means of the novel rack depressor shown in Fig. 4. The parts drop into a woven mesh wire basket and can then be thoroughly rinsed and dried in quantity.

Other plating facilities in this section of the plant include tanks for cadmium plating, Iridite dips, and an installation for electroplating tin from a potassium stannate solution. Metal and Thermit Corporation tin-aluminum alloy anodes are employed to furnish metal for the tin plating operation.

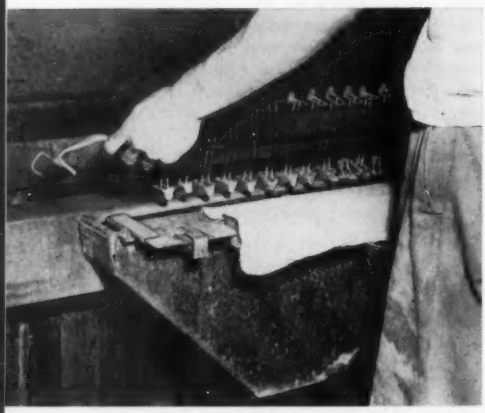

Fig. 4—Chromium plated parts can be unracked quickly and easily by the plater, who merely turns the rack on one side, lowers the portion of the rack containing the parts into a slot, one side of which is movable, operating against a spring. By leaning gently against this side of the unloading device, the plater can press the thick contact wires on the rack together, releasing the plated parts which drop down into a wire mesh basket for final rinsing. By turning the plating rack over, the operator can unload the other side of the rack, performing both operations rapidly.

A specially designed plating installation for hard chrome plating long rods and shafts is in use in the Miller plant. Since the largest parts to be plated are approximately ten feet long, the tanks employed are circular, 16 inches in diameter, and 12 feet deep.

A ¼-ton hoist is used to handle the parts through the various steps in this operation. The first step, after preliminary cleaning, is a reverse current treatment in chromic acid in one of the tanks shown in Fig. 5. An interesting feature of this operation is that a howler has been connected in series with the electrical circuit so that the operator is constantly aware of the fact that a part is receiving reverse current treatment. This eliminates the pos-

sibility that a part may be over treated.

After the proper reverse current treatment, piston rods or shafts are hoisted into the chromium plating tank for application of a thick coat of chromium. This tank is constructed of steel and is lined with lead and chemical brick. A temperature control regulates introduction of steam or water into the system as conditions require. Gas evolution keeps the solution composition and temperature uniform. However, since the solution is so small and the current used for hard chromium plating comparatively high, there is a tendency for the solution to heat and, therefore, the temperature control on this tank is equipped to regulate both heating and cooling.

A Chandeysson 6 volt, 2500 ampere generator furnishes power for this installation.

The portion of the plant devoted to plating small parts in barrels contains facilities for zinc, copper, cadmium and nickel plating. In Fig. 6, the operator can be seen lowering a Lasalco barrel into the zinc plating tank.

The barrel plating process is conventional in most respects with the previously described use of ampere-hour meters to check actual electricity used for each load of parts.

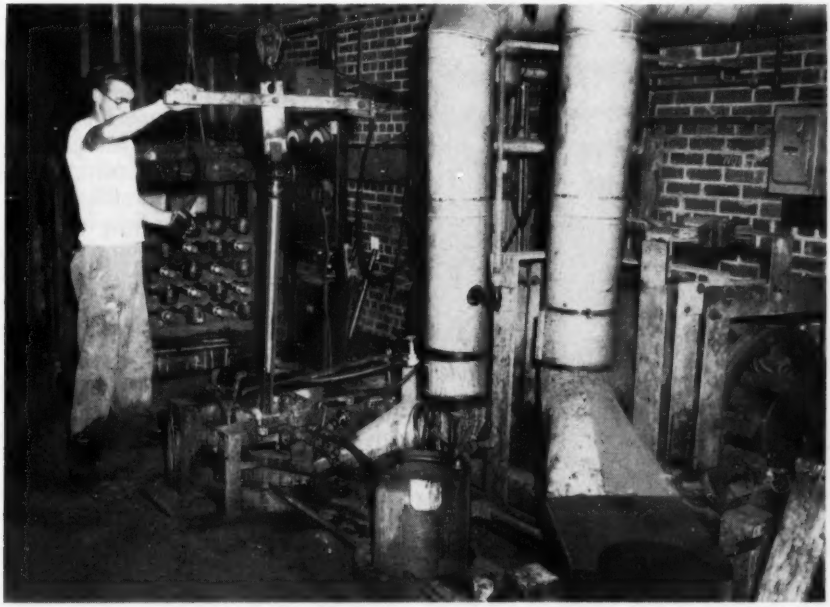

Fig. 5—In this compact hard chrome plating installation, pistons, rods and shafts receive a thick uniform coating of chromium in the narrow, 12-foot-deep cylindrical plating tank. The operator is shown removing a plated rod from the solution. The reverse current treating tank and the rinse tank can be seen in the foreground of the photograph.

"Miller Electroplating . . . has installed incentives for cost reduction and efficient operation."

Parts are loaded into barrels, cleaned, pickled and processed through the various plating solutions. Following the completion of the plating cycle, parts are rinsed and loaded into wire baskets for drying in a Kreider centrifugal dryer. A combined dump-rinse tank equipped with a foot valve to release the water is a feature of this installation. For small lots of the same part or for experimental plating of small quantities, a Stutz portable plastic plating barrel shown in Fig. 7 is employed. Solution temperatures are controlled automatically in all cases as previously described.

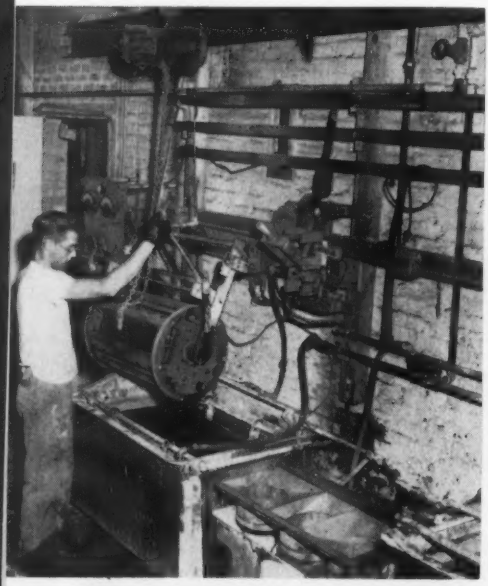

Fig. 6—View of one section of the barrel plating area showing a load of parts in a Lasalco barrel being lowered into place for barrel plating. The overhead hoist runs on a monorail so that barrels can be transported around the area as processing requires.

Facilities are available in the Miller plant for precious metal plating, both in small plating barrels and in specially designed racks. Silver, rhodium and gold solutions are in use. For some parts a combination of barrel plating and plating in special racks is used. On one silver contact, for example, the thickness of silver must be held very closely to 0.0003 inch on one area, while the adjacent areas of the part must be plated to 0.006 inch. This problem is solved by depositing the comparatively thin plate in a barrel, then racking the parts in a special plastic rack exposing only the areas to receive the thick plate and completing the operation in a silver still tank.

Periodic reverse plating is employed for silver plating, using equipment supplied by Unit Process Assemblies, Inc., New York City. The cycle generally used consists of three seconds reverse current and 15 seconds direct plating. This assists in the production of a soft smooth silver deposit. The silver anodes are not suspended from the bus bars as might be expected, but are located in the tank bottom. The large room devoted to precious metal plating is air conditioned in the interest of solution and product cleanliness. Solutions are filtered, temperatures are automatically controlled and all the usual analytical and electrical controls described for other solu-

tions in the Miller plant are employed in this department.

Close control of all plating solutions is maintained in a chemical control laboratory. In addition to the standard analytical procedures for solution analysis, a Beckman pH meter and a Hull cell for making plating tests are employed. By using a modified Mesle chord tester mounted at a slight angle to measure plate thickness, the thickness of each element of a composite plated coating can be determined. Plating thickness is also determined with a Magne-Gage which enables a measurement to be made without damaging the plate.

Control of waste water from the Miller plant is well regulated without requiring special treatment. Concentration rinse tanks keep waste metals to a low value. All rinse waters pass into the same tile and pit, from which surplus water passes into the sewer. Exhaust air is washed as it passes from the plant and this water is added to the disposal system. Since the effluent is a mixture of acid and alkali solutions, it is reasonably well balanced and contains a low volume of contaminating chemicals.

Another interesting feature of the Miller plant is the fact that not only is the ADT fire and burglar protection system used, but the same system is tied in with the steam pressure in the heating system. Therefore, if the steam pressure falls for any reason, ADT receives a signal and an immediate investigation is made to determine the cause. This ensures that all tanks will be at working temperatures at the beginning of each working day.

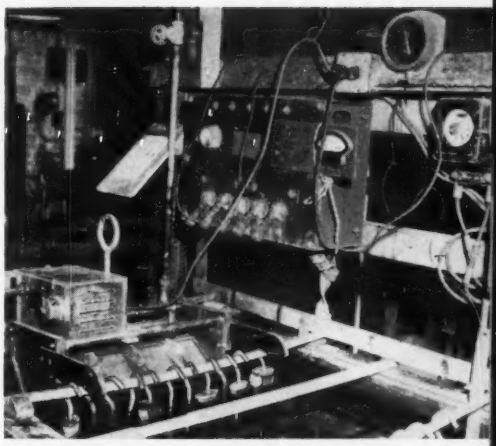

Fig. 7—For plating small lots or experimental lots, a small transparent plastic plating barrel is employed. The illustration shows a Stutz portable plating barrel in acid copper solution. (PRODUCTS FINISHING Staff Photos).

Miller Electroplating, Inc. is an excellent example of a job plating shop that has made a thorough analysis of finishing costs and has also installed incentives for cost reduction and efficient operation. Some of the results obtained are illustrated by ingenious devices developed by the company, in cooperation with its employees, to improve plating and handling methods.

★ ★ ★

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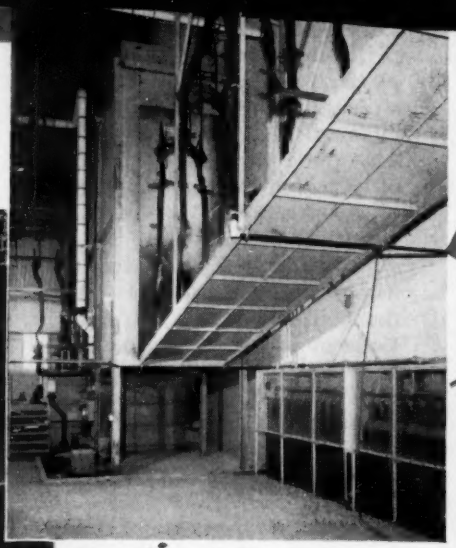
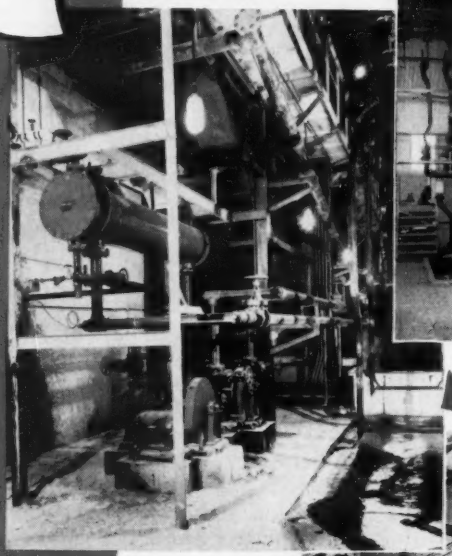
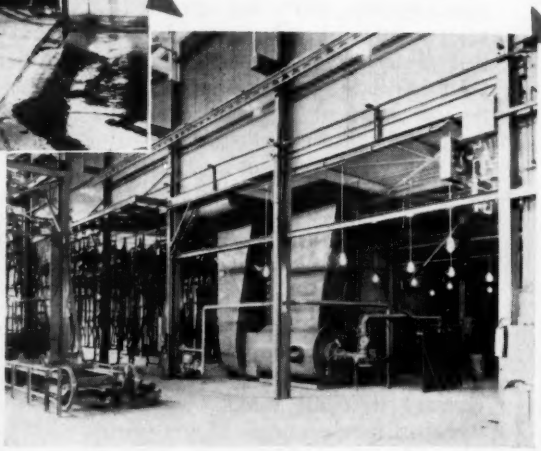
HERE'S HOW AUTOMATION HELPS DIP-PAINT CHASSIS FRAMES

SINGLE STAGE WASHER is steam heated with a total heating capacity of 11,600,000 BTU per hour. A 2000 GPM capacity pump supplies the banks of spray orifices. Chassis frames are in the 10 ft. wash section for one minute. Over-all dimensions of the washer: 40'0" long; 8'2" wide; 27'0" high.





PAINT DIP TANK carries approximately 2400 gallons of paint, agitated by two 2000 gallon pumps. A combination paint cooler and heater cools the paint in summer with 90° water at 100 lbs. pressure, and heats the paint in winter with steam at 100 lbs. pressure. The tank is constructed of ¼" steel plate. Inside dimensions: 52'3" long; 5'6" wide; 8'3" high.



PAINT DRYING OVEN is equipped with two 4,000,000 BTU capacity low pressure gas heaters and two 27,000 CFM air circulating fans with forced exhaust. Temperature is automatically controlled by two L & N recording controllers. Over-all dimensions: 120'0" long; 20'1" wide; 20'8" high with bottom of oven elevated 20'6" above floor.

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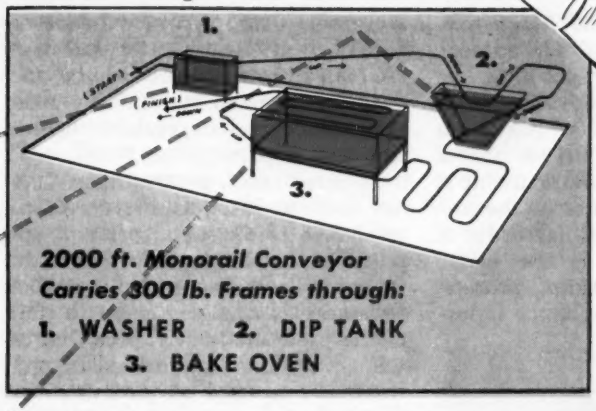

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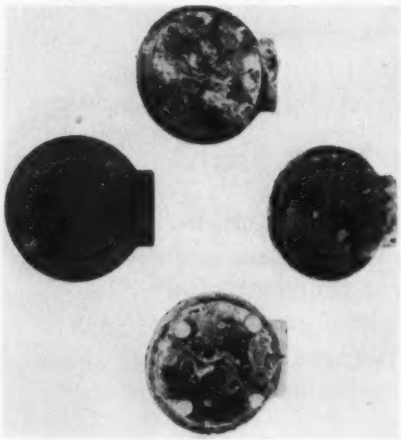
Pretreatment Improves Finish Quality

By GILBERT C. CLOSE

PRETREATMENT OF METALS, sometimes called "rust proofing," or more elaborately "corrosion-proofing," is not a new process. Its value in increasing finish quality has been proven time and again. A major criterion in favor of pretreatment is its almost universal use in the aircraft industry where a high order of corrosion resistance is the prime function of every finishing process. Also, in the home appliance industry, where many products are never refinished after they enter their service life, pretreatment can be the deciding factor in maintaining good appearance and dependable operation over a span of years.



Comparative tests under laboratory control have proved the value of pretreatment in increasing corrosion resistance. The two steel castings (upper and lower) were untreated, while the other two (center) were pretreated with an acid phosphate. Note difference in amount after one week in a salt spray cabinet.

In some cases, pretreatment may act only to increase the corrosion resistance of the metal prior to application of the organic finish. In these instances a sum total corrosion resistance is acquired equal to that of the pretreated metal plus that of the paint film. In other cases pretreatment is used to passivate the metal surface to prevent chemical reaction between the metal and ingredients of the organic film. In either case the net result is preservation of the paint film over a greater number of years than it would last if applied directly to the bare metal.

Metal pretreatments may be divided into three categories. First, there are the various cleaning processes — such as alkali and solvent cleaning, or vapor degreasing — which remove dirt from the metal and provide a clean surface. But cleaning in the general sense does nothing to improve corrosion resistance. In fact, many types of clean bare metal are highly susceptible to corrosion (such as rapid rusting of bare steel) and painting must follow soon after cleaning to prevent the formation of surface oxides.

A second category of pretreatments is employed primarily to roughen the metal surface, thus increasing the mechanical adhesion of subsequently applied organic films. Mechanical roughening is accomplished generally by sand, grit, or shot-blasting, while chemical roughening is accomplished in acid etching solutions. Here again the surface composition of the metal is not altered, and roughening must be followed quickly by painting or oxides will form.

The third category of pretreatments is composed of the various corrosion-proofing processes. These processes are the ones most often ignored and the ones that will give added life to the final finish. Precleaning is necessary with some corrosion-proofing solutions; others accomplish cleaning and passivation simultaneously. In either case, the principal function of the solution is to transform the metal surface into a non-metallic coating that offers a high order of resistance to corrosion, and provides an excellent bonding surface for subsequently applied paint films. Generally, the nonmetallic coating formed is not a chemical deposit on the surface of the metal, but an inherent part of the metal itself.

Most pretreatment processes are economical and easy to apply. Some of them do not alter the dimensions of the part, and may be used either as a base for subsequently applied organic films, or to increase the corrosion resistance of parts which will not be painted. Several commercially available processes will be described as an index as to what can be accomplished by pretreatment.

One such process involves an acid cleaner solution prepared by mixing one part of a proprietary chemical with two or three parts of water. It may be used either as a spray, brush-on solution, or a chemical dip. No precleaning is required unless the parts are soiled with heavy oil or grease. The solution will remove light rust effectively, but heavy rust should be removed by abrasive blasting prior to treatment.

This process, used mainly with steel, not only removes light rust, but passivates the surface in a manner to prevent future rusting. In the same operation, it produces a slightly etched, inert surface that is highly resistant to corrosion and provides a good bonding surface for sub-

Mute evidence of the value of anodizing aluminum to increase corrosion resistance. Test bars at right were anodized; those at left were bare. The results shown occurred during two weeks testing in a salt spray cabinet.

sequently applied paint films. The treatment requires little time, and if the treated parts are rinsed in hot water to expedite drying, they are soon ready for the paint shop.

Another group of chemicals is compounded specifically for the treatment of cadmium plated or zinc coated surfaces that will be subsequently painted. Difficulty is encountered in applying an organic finish directly to either cadmium or zinc. The deteriorating agencies found in the atmosphere (oxygen, carbon dioxide, and moisture) immediately attack the galvanized or cadmium plated surface and produce a series of complex oxides and carbonates before it can be painted. Later, after painting, these chemicals react with the fatty acids in the paint oils and gradually break down the bond between the metal and the paint.

Pretreatment transforms the metallic surface into a dense coating of metal phosphates or chromates, which is impervious to the deteriorating agencies just mentioned and which provides excellent bonding characteristics for subsequently applied paint films. Spray, dip or brush application methods may be used. The coating is not affected by temperature, and may be used as a base for baked enamel, Japan and other finishes.

Another process, intended primarily for pretreatment prior to painting may be applied by immersion or by spray, depending on the

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Admiral, Hotpoint, Sunbeam, General Electric, Westinghouse, Cadillac Motor—all have proved it in the past four years. They report production increases up to 200%. That's why all have reordered.

They've shaved maintenance costs as much as 90%. What would these precentages mean to you in dollars saved and dollars received from increased gross sales?

How are these figures possible? These companies and many others are checkmating rising production costs by utilizing the efficient operation of Jensen PAN - L - HEAT Ovens.

Completely different, patented construction principles of Jensen Infrared Ovens have reversed cost curves, have caused production curves to soar in finishing plants in every industry.

size of the parts and the number treated. Precleaning is necessary using either an alkaline bath or solvent cleaner. Treatment time varies from one to five minutes, depending upon the density of the coat desired.

This pretreatment process produces a hard, non-metallic phosphate surface on the parts. The crystal phosphate is insoluble in water, thus a high order of moisture resistance is obtained. When subsequent finish coats are applied, a portion of the finish is absorbed into the minute cavities between the phosphate crystals, thus creating a strong bond.

The process may be used with iron and steel, galvanized and galvannealed surfaces, zinc coated and zinc alloy materials, and cadmium plate. The process has proved valuable for treating zinc base die castings to produce a surface to which paint will adhere.

Another similar process transforms the metal surface into an insoluble phosphate with high corrosion resistance. This process does not affect the dimensions of the part and is often used to produce a protective coating on precision parts which will not be subsequently painted. The treatment is applied by hot immersion. Parts must be thoroughly cleaned prior to treatment. Treatment time depends upon the density of the coating desired. When the parts will not be painted, a final finish is obtained by an oil dip. By dipping the parts in a black stain prior to the oil treatment, a lustrous black coating is obtained. The fine grained, smooth coating produced by the

to page 50 →

cutting finishing costs than you do–

"Butterfly heat distribution gives us the heat uniformity we need."—Hartford Industrial Finishing Company. "Paint drying, handling time reduced over 700%"—Lockheed Aircraft. "Never saw better ovens than PAN - L - HEAT"—Sunbeam Corporation.

Investigate possibilities of PAN-L-HEAT in your finishing operation. This coupon will bring you immediate action, or check the publisher's reply card.

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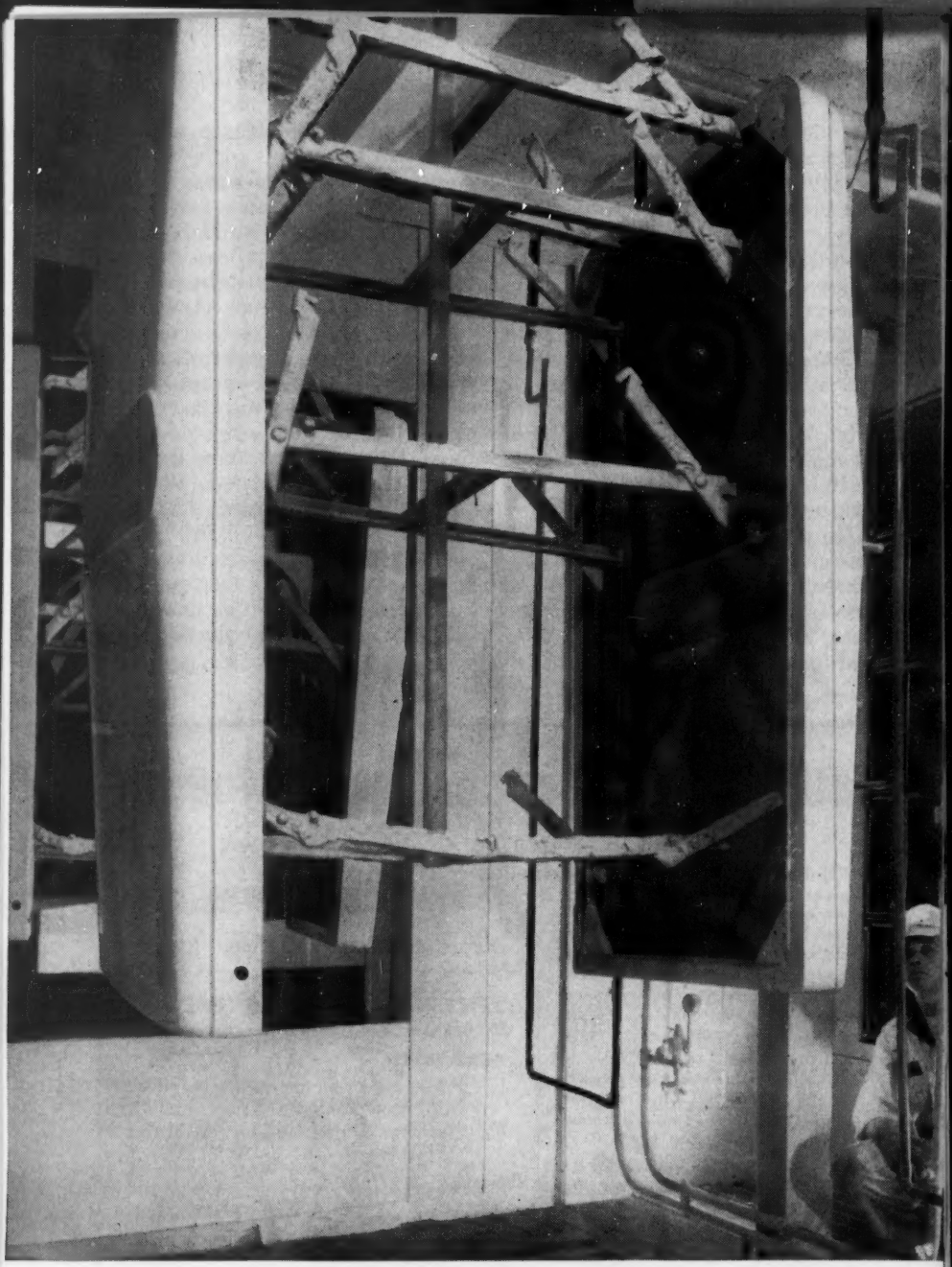

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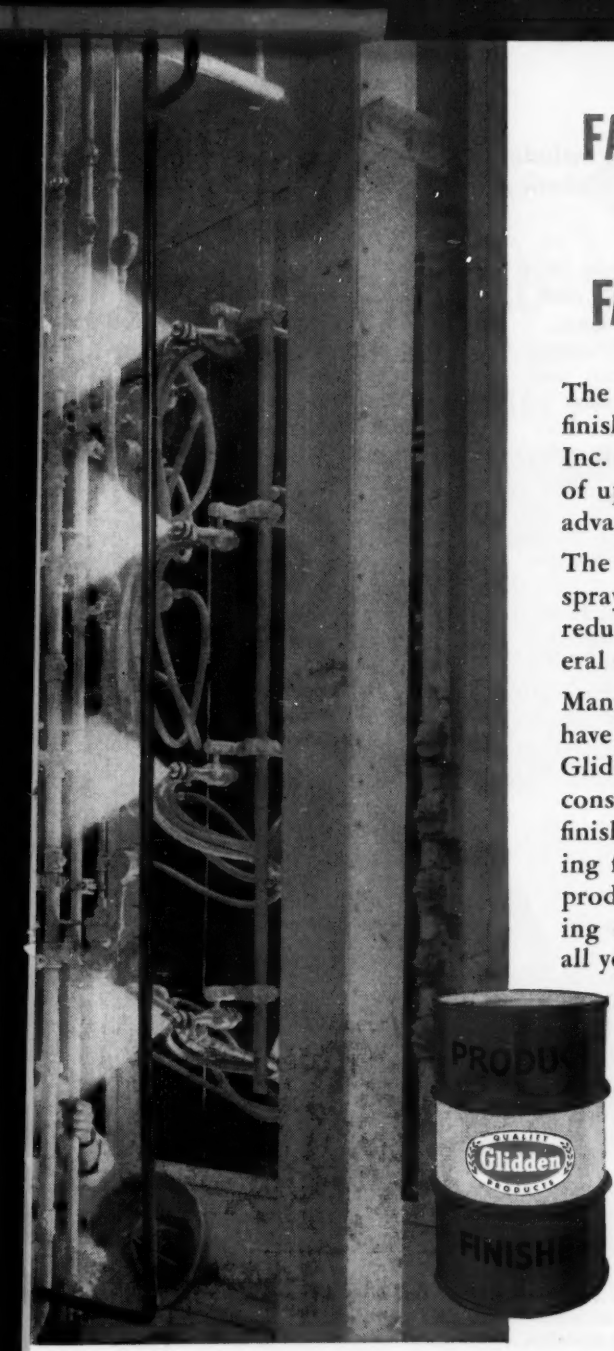

FASTER FINISHING FOR FAMOUS FREEZER

The completion of a new automatic finishing line at Amana Refrigeration Inc. has given this pioneer builder of upright freezers many finishing advantages.

The switch-over to an electrostatic spraying system speeded production, reduced rejects and eliminated several costly finishing problems.

Many of the recommendations which have proved so successful were made by Glidden Technical Servicemen. This is consistent with the type of start-to-finish help G.T.S. provides in improving finishing procedures, increasing product quality and lowering finishing costs. Call on Glidden *first* for all your finishing needs.

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INDUSTRIAL FINISHES DIVISION

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"Treatments for aluminum include . . . anodic, oxide, chromate, or complex phosphate coatings."

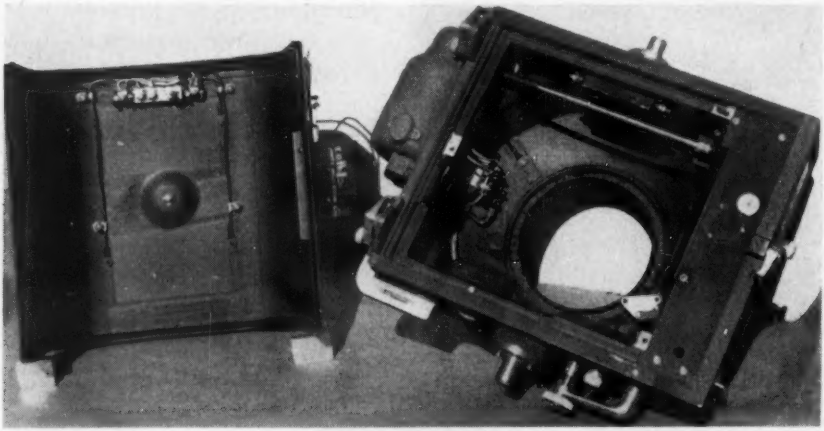
process makes it suited to screw machine parts and other small components of precision mechanisms.

Various proprietary processes are available for treating iron and steel alloys, the light alloys such as aluminum and magnesium, cadmium plated surfaces, and galvanized or galvannealed surfaces. Spray, dip or brush methods may be used for application.

One chemical treatment process is peculiar in that it forms a thin, tough film over the treated surfaces. This film will protect the surfaces during extended storage and may be removed or left intact when the surface is finally painted. The product is applied warm and without dilution, using either spray, brush or dip methods. As the film formed is very thin and flows readily during application, the process may be used on small, irregular parts such as knurled bushings, and screw parts.

Aluminum (and its alloys) is being used in increasing amounts in various industries, and pretreatment of aluminum is just as vital as pretreatment of the heavier alloys. Treatments for aluminum include processes which form anodic oxide, chromate or complex phosphate coatings.

It is dangerous for any manufacturer to take the attitude that if a product looks well when it leaves his finish line he has fulfilled his obligation to his customers. The obligation of maintaining this good

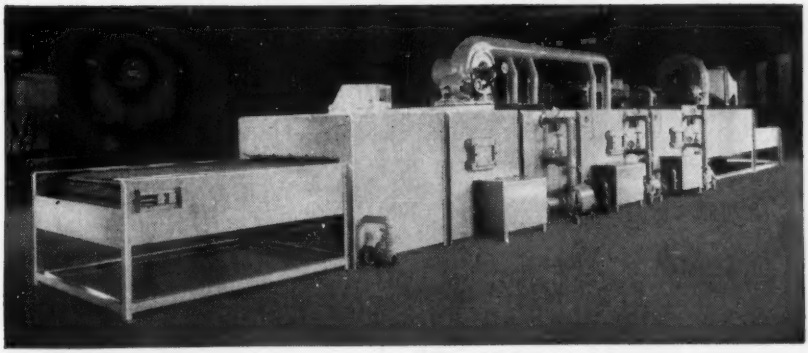


Interior of aerial camera after two years of service by Navy on ship-based photo reconnaissance airplane. All steel and magnesium components were pretreated. No evidence of corrosion exists despite the highly corrosive conditions under which the camera operated.

HOW THIS NEW A-F

ENGINEERED MACHINE

washes both Aluminum and Steel Sheets "CHEMICALLY CLEAN"



To get aluminum and steel sheets, covered with mill oil and shop dirt, "chemically clean" and thoroughly dry for the perfect plywood-to-metal bond required by a manufacturer of decorative panels, A-F Engineers shop-tested a method for over 30 days to find the exact cleaning solution that, coupled with the A-F *Super Spray* Cleaning and Rinsing action, would remove all traces of oil and dirt —then designed and built this special wash-rinse-dry machine. The superheated air used in the drying phase is filtered to keep it dust and dirt free. Since installation, this machine has more than filled the panel manufacturer's requirements.

Perhaps you have a troublesome metal products cleaning and finishing problem. A-F Engineers can help you solve it. Write for new FREE 28 page folder today.

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Engineered CLEANING and PROCESSING MACHINES

A-F Est. 1901

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appearance remains alive throughout the service life of the product.

Pretreatment of metals prior to application of a paint finish lengthens the service life of the finish or finishes applied.

Magnesium test bars after 72 hours in a salt spray cabinet. Test bars No. 1 and No. 3 (left to right) were left bare; test bars No. 2 and No. 4 were pretreated using the chrome-pickle treatment. Note pronounced corrosion resistance of pretreated bars.

★ ★ ★

New Plating Process for Aluminum Bus Bars

BUS duct with aluminum bus bars is being manufactured by the Westinghouse Electric Corporation's Standard Control Division. The duct has double silver-coated aluminum bars to provide low resistance contacts as joints. It is available in ratings of 225 through 4000-amperes, underwriters approved.

A two-year research and development program in connection with the new duct has shown that best adhesion is obtained when silver is plated onto a silver strike rather than the conventional plating of silver on aluminum. Thus the aluminum bars are put through a 12-step process which includes an acid dip and a zincate dip in addition to the strike, the electroplating, and various cleaning and rinsing steps. The plating process is designed to help eliminate the possibility of electrolytic action.

★ ★ ★

"Look! Just cause that's a stock room don't mean I have to take any of your bull."

EPON RESIN does it!

a tougher, more corrosion-resistant primer for metal lawn furniture . . . *at lower cost*

New Epon primer, formulated by The Glidden Company, Cleveland, is the key to a better finish on metal lawn furniture.

HERE'S HOW...

EXPOSED to blistering sunlight, rain, and often to corrosive salt sea breezes—lawn furniture must have a tough, corrosion-resistant finish.

For this reason, the Troy Sunshade Company has set high standards of durability and appearance for finishes on its quality metal lawn furniture. When metal shortages made it necessary to abandon chrome plating, Troy engineers made a careful study of paints and paint-finishing methods. Tests showed that the *primer* coat was the key to paint durability . . . *and that an Epon resin-based primer gave improved appearance and the highest degree of resistance to corrosion.*

The Epon resin-based primer is applied by rotary spray coating. The finish coat is applied by electrostatic spraying. Both operations are completely conveyorized. Thanks to the excellent adhesion and levelling properties of the Epon primer, expensive sanding operations are reduced to a minimum. Troy engineers estimate that the new finishing system saves as much as a dollar a gallon on materials, in addition to savings in labor costs.

• • •

Call on our sales offices for names of suppliers who sell Epon resin coatings. Write for the full Epon coatings story in the new brochure, "Planning to Paint a Pyramid?"

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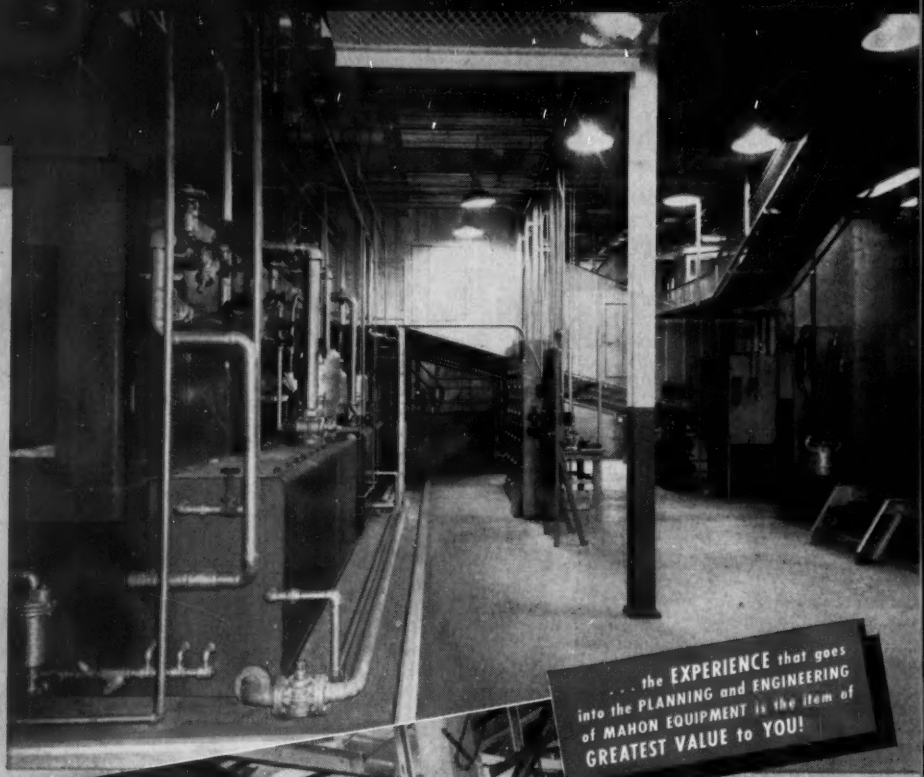
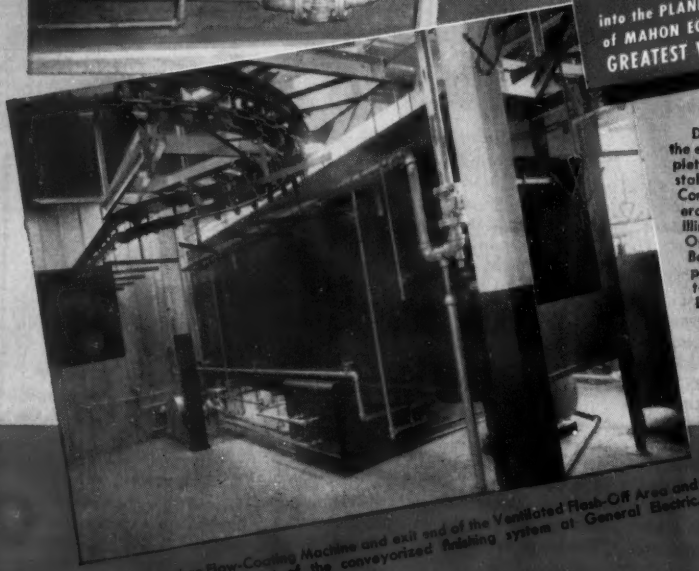
COMPLET



. . . the **EXPERIENCE** that goes into the **PLANNING** and **ENGINEERING** of **MAHON EQUIPMENT** is the item of **GREATEST VALUE to YOU!**



Mahon Flow-Coating Machine and exit end of the Ventilated Flash-Off Area and Drip Zone—part of the conveyorized finishing system at General Electric.

Directly above is a view inside the enclosure which houses the Complete Mahon Finishing System installed in the General Purpose Control Department of the General Electric Plant, Bloomington, Illinois. At Right above: Mahon Open-Face Hydro-Filter Spray Booth designed to meet specific painting requirements of certain units produced by this Department. At the extreme right is the Control Panel for the entire system. All Starters, Electrical Controls and Enclosures are General Electric.

M

E Finishing SYSTEMS

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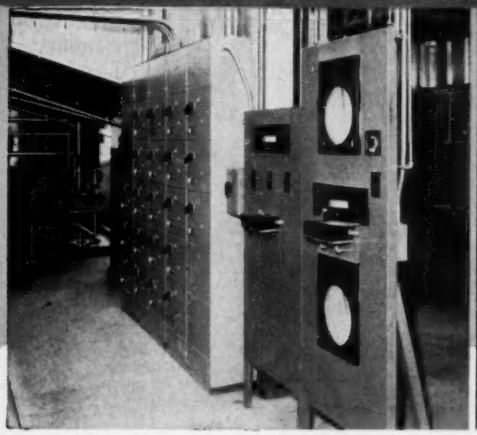
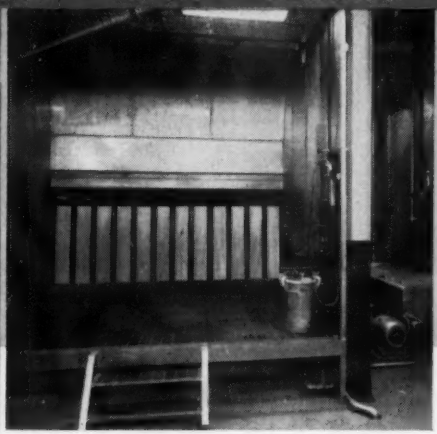




General Electric CONTROL ENCLOSURES are Painted in a COMPLETE, MODERN MAHON FINISHING SYSTEM!

Products of the General Purpose Control Department of General Electric, Bloomington, Illinois, now receive their fine finish in a completely new, highly efficient Mahon Finishing System. Facilities are provided for both continuous conveyorized processing and painting of normal units and individual handling of larger units. The continuous processing system includes a Five-Stage Metal Cleaning and Rust Proofing Machine, Dry-Off Oven, Cooling Tunnel, Flow-Coater, Flash-Off and Drip Zone Enclosure, and a Finish Baking Oven. Both Ovens and the Cooling Tunnel are located overhead. In addition to the conveyorized system, a Two-Stage Metal Washing Machine was provided together with a Special Open-Face Hydro-Filter Spray Booth and a Batch Type Finish Baking Oven to handle unusually large units. Other equipment includes a Filtered Air Supply System and Stripping Facilities. The entire system is modern in every respect and is engineered into a surprisingly small area of floor space. All facilities are housed within an air conditioned and pressurized enclosure. If you are contemplating new finishing equipment, you, too, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning, coordinating and engineering of equipment—which is the key to fine finishes at minimum cost. You will find also, that Mahon equipment is built better by Mahon for more economical operation over a longer period of time—a point which should receive your careful consideration when comparing initial costs. See Sweet's Plant Engineering File for information, or write for Catalog A-655.

THE R. C. MAHON COMPANY • Detroit 34, Michigan • Chicago 4, Illinois

Engineers and Manufacturers of Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Spray Booths, Flow and Dip Coaters, Drying and Baking Ovens, and Complete Conveyorized Finishing Systems.

AHON

Spotlighting FINISHING Progress

Design Factors for Electroforming

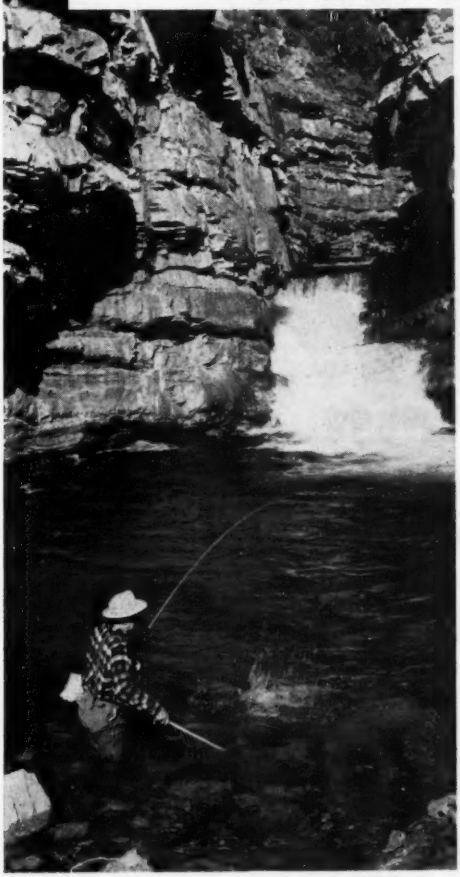
AT A RECENT MEETING of the Potomac Chapter of the American Society of Tool Engineers, William H. Metzger of the National Bureau of Standards discussed the problem of Design Factors in Electroforming*. Mr. Metzger pointed out that parts which have been successfully produced by electroforming range in size from tubes with a bore diameter of 0.002 inch to large molds for plastic aircraft fuselage parts. In general, the following types of parts are said to be particularly suited for manufacture by electroforming: (1) simple, symmetrical, thin-walled parts; (2) complicated parts capable of reproduction by electroforming where machining is difficult and costly; (3) parts in which components can be readily grown-in but which could not be assembled by standard methods; (4) parts with critical inside dimensions and finish; and (5) small numbers of parts where standard methods of fabrication involve high tooling costs. Typi-

* See also "The Tool Engineer," 33, 55 (Aug. 1954).

Dr. Seymour Senderoff
Supervisory Chemist,
Electrodeposition Section
National Bureau of Standards

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

It takes more than a good fly to take a trout



Even the costliest fishing gear, the finest rod, the best reel and the prettiest fly can't assure catching a wily trout. It's the experience behind these accessories, that fills the creel.

There's no substitute for "Know-How" and that's particularly true in adapting metal treating chemicals to established production. It can't be gotten out of books, through black magic or out of a crystal ball. Only years of active contact, with actual manufacturing procedures, can be depended upon for satisfactory solutions of the metal protecting problems constantly confronting manufacturers.

ACP offers ideal products for removing and preventing rust on metal, chemicals to bond paint to steel, zinc, and aluminum, and pickling acid inhibitors. In addition, ACP furnishes a free service of an organization of technical experts with over 40 years' experience in solving metal preservation problems for the largest as well as the smallest operation.

Rely on service backed by experience. You are obligated in no way by consulting our technical staff.

Write or call for further information on ACP chemicals for metal protection.

Since 1914, Pioneering Research and Development in Metal Protection

AMERICAN CHEMICAL PAINT COMPANY

CHEMICALS ACP PROCESSES

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CHEMICALS ACP PROCESSES

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cal electroformed parts are shown in Figs. 1 and 2.

Matrix Design and Use: The mold, or matrix, is the base on which the electroformed part is produced. It can be made by machining or casting, or a number of highly accurate matrices may be made by electroforming on a single machined positive. The matrix may be either permanent, soluble, or fusible. A permanent matrix, usually made of metal, is used when the part is of such shape that the matrix can be removed without damage. A soluble matrix is used where a high finish and low dimensional tolerances are required, but the shape of the article prevents withdrawal of a permanent matrix. A fusible matrix may be used when the finish and tolerance requirements are not too drastic. Matrix materials are listed and described in Table 1.

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These new all-neoprene top quality gloves offer a real bonus in job efficiency and economy, through extra long life and superior hand protection. Available with "Grip-Saf" hand or smooth finish in a complete range of sizes, lengths, and thicknesses. Try "Neo-Sol" all-neoprene gloves in your plant for plus qualities in hand comfort, flexibility and touch sensitivity. These new gloves have red inner lining and red roll at the cuff.

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Write for NEW 28 page Catalog of Industrial Protective Equipment

Separating Methods: A film must be formed on permanent metal matrices so that the electroformed part will adhere sufficiently well to prevent buckling or blistering, but not so well as to interfere with removal of the matrix at the end of the operation. Such a film may be formed on plain steel by application of graphite, or by formation of an oxide or chromate film, by immersion in 0.1 per cent potassium dichromate solution. Alloys such as stainless steel, Inconel, or Invar have a natural oxide film which must be

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- *CLEAR METAL AND WOOD LACQUERS*
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BAKED OR AIRDRY— CLEAR, TRANSPARENT COLORS OR ENAMELS

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Eye Appeal Sells Your Product!

Why jeopardize your reputation with inferior finishes when the finest cost no more?

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made homogeneous by a special passivation treatment involving cathodic treatment in sulfuric acid, a dip in hydrochorlic acid, and a final dip in dilute dichromate solution. To obtain satisfactory adherence on a chromium plated matrix it is necessary to modify the natural oxide film by alternate cathodic treatments in sulfuric acid and alkaline cleaner.

A silver flash may be applied to a matrix and treated to form a separation film consisting of silver sulfide or iodide, the former by immersion in a sodium sulfide solution, and the latter by immersion in a dilute solution of iodine in water and alcohol, or water and potassium iodide.

A film of fusible metal is another type which may be used. The matrix is plated with 0.001 to 0.002 inch of lead, tin, or cadmium and electroforming performed on this surface. To remove the matrix, heat is applied to melt the fusible intermediate layer, thus destroying the bond between the part and the matrix.

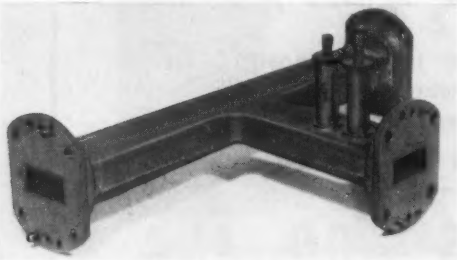
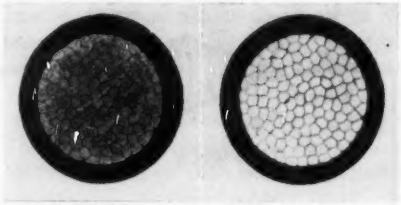


Fig. 1—Electroformed wave guide with fillets in corners.



A B

Fig. 2—Electroformed copper grids made by special process: (A)—grid with aluminum core; (B)—grid with core dissolved. Web is approximately 0.0002 inch thick. Magnification is 4X.

Aluminum matrices require a zincate film to improve adhesion, non-conductive matrices require only the usual conducting films, and fusible metal alloy matrices require sulfide or oxide films of the types described above to prevent adherence of globules of the matrix to the finished part.

Part Design Factors: By considering the throwing power characteristics of the plating bath when designing parts for electroforming, the cost of the operation can be reduced, and the quality of the product improved. The author points out that the variations in thickness of deposit at projections and recesses can be minimized by the plater by using shields and "current thieves," but these expedients increase the cost of the part. He gives the following rules to be observed in the design of electroformed parts: (1) Recesses should be as wide and shallow as possible; (2) Internal angles should preferably be obtuse, with fillets at the apices; (3) Projections should have rounded contours and outside angles should have radii at their apices.

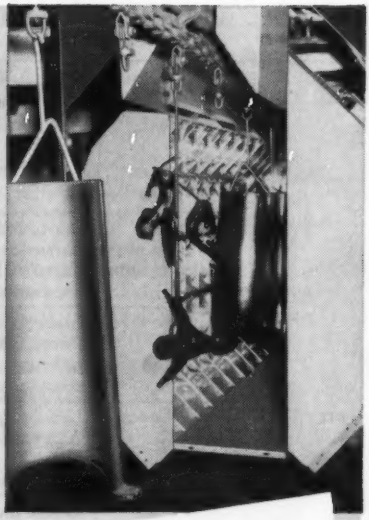
REQUEST:

What can we do about costly drying operations?

REPLY:

REDUCE TIME AND EXPENSE WITH A FOSTORIA RADIANT OVEN

Fostoria infrared puts the heat on the product . . . *instantly*. No wasteful "warm-up;" accurate heat control. You save money because drying is faster and more efficient.



CASE HISTORY:

The above photo was taken at the Cream Separator Division of International Harvester at Richmond, Indiana. Operation shown is baking enamel finish coat on parts.

A few years ago, these parts were baked with a convection oven. It occupied 480 square feet of floor space and required a baking cycle of one hour.

The company now uses a Fostoria Radiant Oven. This unit costs less to buy. It is only eleven feet long, and bakes thoroughly in just eleven minutes.

Does this give you an idea? If there is a baking, heating or drying operation in your plant, it can be done faster, cheaper, better, and in less floor space with a Fostoria Oven.

Find out about a specially-designed Fostoria Oven for your requirements. It'll pay for itself in a matter of months. Just contact our representative or write directly to the company.

5501

Write for the free booklet, "How Thousands of Plants Cut Costs."

INFRA-RED fostoria SYSTEM

THE FOSTORIA PRESSED STEEL CORPORATION, DEPT. 422, FOSTORIA, OHIO

Table I

COMPARISON OF MATRIX MATERIALS

Type	Material	Advantages	Disadvantages
Permanent	Plain steel	Availability, low cost.	Attacked by some plating solutions, such as acid copper and hot iron chloride.
	Plain steel plus chromium or silver plate	Improved hardness and/or corrosion resistance. Coating can be stripped and renewed.	Chromium coatings may be pitted by hot chloride type baths.
	Stainless steel, Inconel	Inert to most plating solutions. Natural oxide film prevents adhesion of most deposits.	High cost. Soft surface of non-hardenable types is easily scratched.
	Invar, Kovar	Low temperature coefficient of expansion facilitates removal from electroform. Non-adherent.	High cost. Poor machinability.
	Brass plus plated coating (Ni, Cr, Ag)	Good machinability. Low cost.	Surface easily scratched when plated with silver or nickel.
	Glass, quartz	Close tolerance. High finish.	High cost. Fragile. Requires a conductive coating.
	Wood, plaster, plastic, etc.	Low cost. Moldable. Flexible types can be withdrawn from undercuts.	Large tolerances. Requires a conductive coating and/or sealing.
	Aluminum	Good machinability. Good finish. Close tolerances can be held in complex non-withdrawable shapes. Soluble in sodium hydroxide.	High cost. Surface easily scratched.
Soluble	Zinc and zinc alloys	Can be die cast.	Acid stripping solution more likely to attack electroform than caustic solution used for dissolving aluminum.
	Plastics	Moldable. Low cost. Fairly close tolerances.	Cannot be used in hot plating baths. May swell in some baths. Requires conductive coating.
Fusible	Low-melting alloys (Pb-Sn-Bi types)	Can be cast at low cost.	Difficult to remove completely from electroform.
	Waxes	Can be cast or molded at low cost.	Easily scratched. May deform by creep. Require a conductive coating.

HONITE Barrel Finishing Produces

Superfine Sanitary Finish!

Cherry-Burrell Corporation, Milwaukee Division, made large savings when they switched to the HONITE Barrel Finishing Method, *and* actually improved the sanitary finish necessary on their line of food processing equipment.

The milk filler tank shown below was formerly finished in two hand operations—grinding to remove weld splatter and polishing to bring the surface down to 15 R.M.S. Recently, Methods Engineer Ralph Wenger supervised a change to the HONITE Barrel Finishing Method.

Results? The recommended HONITE procedure eliminated the polishing operation completely, and 60% of the rough grinding hand operation. Finishing time was cut 1½ hours . . . and finishes were improved to a superfine finish.

CHERRY-BURRELL METHODS ENGINEER, Ralph Wenger, holds a 40 lb. stainless steel milk filler tank. HONITE Barrel Finishing Method produced its superfine finish.

Your HONITE Methods Engineer or nearby HONITE distributor can help **you** increase production and cut costs, too. Call him today, or write Minnesota Mining and Mfg. Co., Dept. PP-35, St. Paul 6, Minn., for FREE copy of booklet; "Facts and Figures Report on HONITE Barrel Finishing."

Made in U.S.A. by Minnesota Mining and Mfg. Co., General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Ave., New York City. Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

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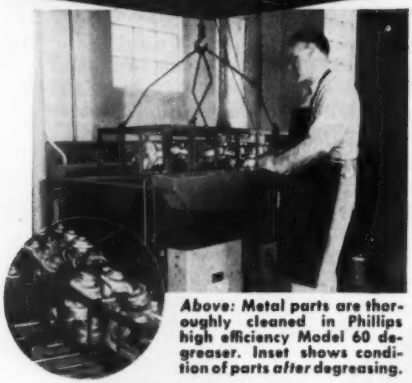
POWER TOOL MANUFACTURER CLEANS CASTINGS, STAMPINGS, MACHINED PARTS, FASTER AND MORE THOROUGHLY WITH A PHILLIPS DEGREASER



Above: **Metal parts are thoroughly cleaned in Phillips high efficiency Model 60 degreaser. Inset shows condition of parts *after* degreasing.**

HERE is another case illustrating the high cleaning efficiency of Phillips degreasers. Skil Corp., Chicago, uses a Phillips Model 60 electric batch-type machine to clean aluminum and iron castings, steel stampings, shafts and screw machine parts. These parts are thoroughly cleaned before painting and assembly. Among the types of soil removed are coolants, kerosene, drawing oils, and plain shop dirt.

Skil reports that the Phillips unit cleans their parts 3 to 4 times faster than their former method. Production is speeded up and better quality control is assured.

Our representative will be glad to discuss your problem with you.

SEND FOR YOUR COPY OF THIS NEW BULLETIN—Describes and illustrates Phillips engineered metal cleaning equipment.

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Spotlighting Finishing Progress

Theoretically, it is impossible to deposit metal within the apex of any sharp angle. The author has found that for copper and nickel deposits, if the radius of a fillet in a 90 deg. angle exceeds 0.02 inch per 2 inches of shank length, the ratio of the thickness of the deposit in the corner of the angle to the thickness on the shank becomes nearly independent of the radius. Since the relative thickness in the corner falls rapidly with a decrease in radius below this value, this is the minimum radius that should be used. It is known, however, that sharp internal angles do actually fill up with deposits of sufficient thickness and the photomicrograph of Fig. 3 shows how this happens. Instead of depositing metal in the corner, columnar crystals grow out from the sides to meet in a cleavage plane bisecting the angle. This cleavage plane is a source of structural weakness in the part, and can best be avoided by the use of a fillet.

Mr. Metzger indicates that the following approximate rule applies: A fillet whose radius is equal to or greater than the thickness of the electrodeposited metal will prevent the formation of a cleavage plane in the apex of an internal angle; if the radius of the fillet is smaller than the thickness of the plating, a cleavage plane will form in the portion of the deposit beyond the thickness equivalent to the radius of the fillet. Figure 4 is a photomicrograph of a deposit of the latter type. This combination deposit is stronger than

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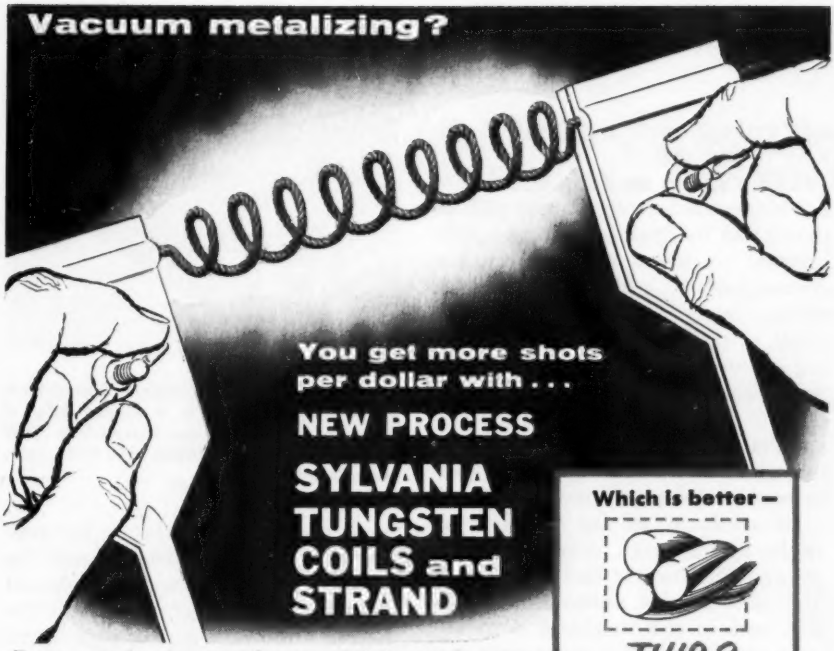

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one without such a deposit in the apex of the angle.

When a sharp angle in a part cannot be avoided, strength may still be developed by first depositing a substantial thickness of metal in the corner, forming a fillet over this with solder, sprayed metal, low-melting alloy, or plastic, and finally depositing a sound electroplated layer over this fillet, as shown in Fig. 5. Growth of a cleavage plane may be stopped by an intermediate machining operation which has been performed on the part shown in Fig. 6.

In addition to the problem of angles and recesses, other points for the consideration of the designer are discussed by the author. He states that certain combinations of metals such as plain steel joining pins in a stainless steel matrix, or copper or brass inserts in an aluminum matrix,

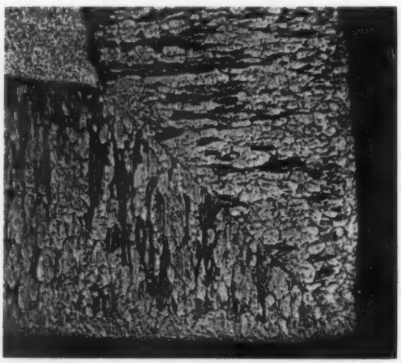

Fig. 3—Cross-section of copper deposit from acid sulfate bath in a sharp right angle shows weak plane formed by juncture of columnar crystals growing from sides of the angle. Magnification is 50X.

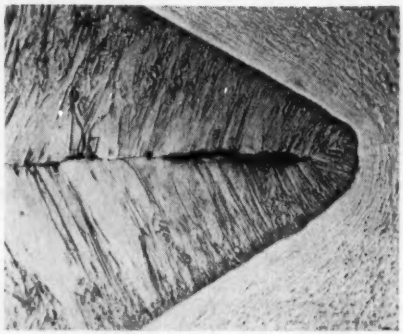

Fig. 4—Cross-section of copper deposit from an acid sulfate bath in a filleted internal acute angle showing sound deposit in fillet and cleavage plane. Radius is 0.0025 inch. Magnification is 200X.

cause serious difficulties in the preplating operations and should be avoided. Further, the design should include some sort of handle on the matrix, and in the case of permanent matrices, provision should be made for applying a separating force by means of a screw or arbor press or other means. With soluble matrices provision for circulating the solvent through the matrix by means of drilled channels greatly speeds up the solution operation.

Metals Used for Electroforming: The most commonly used metals are copper, silver, nickel, and iron. One of the advantages of electroforming is the ability to vary the physical properties of the deposited metal to obtain desired characteristics by control of the composition and operating conditions of the plating baths. Table II indicates the range of properties obtainable with a number of electrodeposited metals. In addition to these metals, gold, zinc, lead, antimony, chromium, and alu-

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minum, and alloys such as cobalt-phosphorous, nickel-phosphorous, and cobalt-tungsten have been used in special applications. Also, laminated deposits may be made where a combination of properties in a part is required, such as copper for conductivity and iron or nickel for strength, or iron sandwiched between two layers of nickel for surface corrosion resistance at low cost for the entire part.

Plating Solutions: Electroforming with copper can be accomplished with the acid sulfate, fluoborate, pyrophosphate, and high speed cyanide baths, the latter used with periodic reverse current. The acid sulfate bath with an addition agent such as phenol sulfonic acid or one of the proprietary addition agents is most popular. The author indicates that the high-speed cyanide bath with periodic reverse current* has interesting properties for electroforming. By varying the reversing cycle, throwing power can be controlled to some extent and bright deposits at maximum thickness may be obtained.

The standard Watts bath is probably used more commonly for nickel electroforming, but the use of the sulfamate, all-chloride, and hard nickel baths has also been reported. The author believes that addition agents should be avoided because of their effect on stress, and that a Watts bath which has been carefully purified and supplied with adequate agitation will give ductile pit-free deposits when operated at pH 4.5.

Silver is deposited from the high concentration bath used for the silver plating of engine bearings, and may be used with or without periodic reverse current.

Electroformed iron is usually deposited from the hot ferrous chloride-calcium chloride bath. Good results have also been reported from the ferrous fluoborate bath.

Mr. Metzger concluded by expressing his belief that as designers

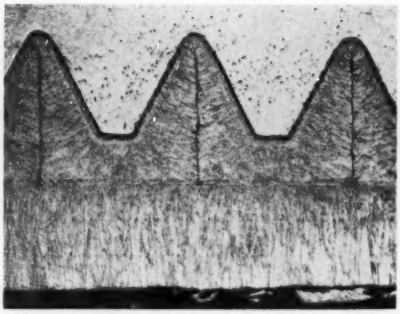

Fig. 6—Cleavage planes in acute angles have been interrupted by machining. The layer deposited on machined surface is sound.

* U. S. Patents, 2,451,340 and 2,451,341, G. W. Jernstedt to Westinghouse Electric Corp.

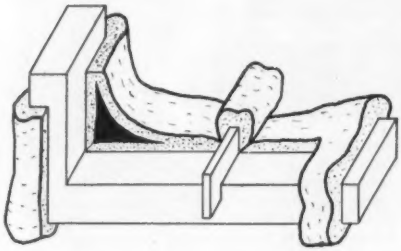

Fig. 5—Matrix showing buildup of deposit in a right angle corner with a fillet fill-in and deposit on a built-in insert.

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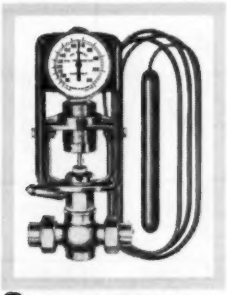

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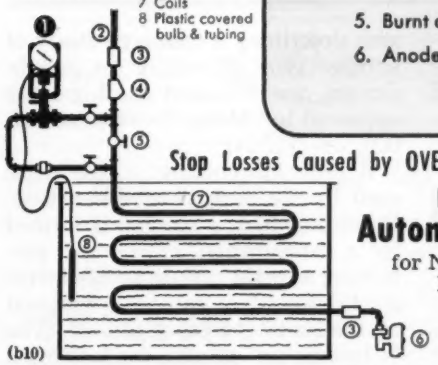

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Table II

TYPICAL PHYSICAL PROPERTIES OF THE COMMONLY USED ELECTROFORMING METALS

Metal	Plating Solution or Treatment	Tensile Strength (p.s.i. x 10^3)	Ductility Elongation in 2 in. (%)	Hardness (Vickers)
Copper	Acid sulfate	34-68		42-83
	High speed cyanide		33-48	100-200
	with periodic reverse	—	—	
	Fluoborate	17-38	6.5-18.5	41-71
Silver	High concentration, high speed cyanide	34-48	12-19	55-93
Nickel	Watts	60-80	10-30	140-250
	All chloride	90-135	4-17	200-350
	Ammonium salt type	140-160	4-9	350-500
	Sulfamate	94-155	3-5	200-550
Iron	Ferrous ammonium sulfate	113	0-3	180-350
	Hot ferrous chloride	55-80	15-25	135-220
	Annealed at 1650 deg. F.	35-47	25-40	50-90
Cobalt-tungsten alloy	As plated	120	0-slight	330-620
	Heat treated	—	Ductile if heated above 1650 deg. F.	250-1000
Cobalt-phosphorous alloy	Low phosphorous (1%), as plated	130	0-7	350-700
	Heat treated	—	0	500-1100

become more familiar with the possibilities of electroforming, and platers more familiar with its specialized techniques, the use of this production method will increase.

★ ★ ★

Oxidation Resistance of Diffusion Coatings on Molybdenum Wire

A STUDY of the oxidation resistance of electroplated coatings on molybdenum was discussed in the August, 1954 issue of PRODUCTS FINISHING. Since then, an article by C. J. Leadbetter and D. T. Richards describing a thorough study of another type of coating for molybdenum, the diffusion coatings, has appeared in "Metal Treatment," 21, 309, 387 (1954).

A diffusion coating, in the sense used by the authors of this article, is one in which a coating is formed by a cementation process by permitting a metal surface to react with a solid, liquid, or gaseous compound of the metal to be deposited. The "Chromizing" process for forming a chromium coating on steel falls into this class of coatings, as does the siliconizing of molybdenum to produce the disilicide coating which

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was one of the first to show promise as a coating for protecting molybdenum against oxidation at high temperatures.

In choosing the coating systems for study the authors were guided by the following characteristics which they consider to be requirements for a satisfactory coating: (1) the metal or alloy of the coating should have a sufficiently high melting point; (2) alloys formed by interdiffusion of the coating and base metal must also have melting points above the temperature to be encountered in service; (3) alloys consisting of a solid solution would be preferable since the oxide layers formed from them would more likely be continuous; (4) the oxide layer formed by the coating should have a high melting point, very high electrical resistance, low vapor pressure, and be self-healing.

The following coating systems were studied to find oxidation resistances under various conditions:

1. Metals: Al, B, Be, Cr, Si, Ti, V, Zr.
2. Alloys consisting of composite coatings of separately formed layers: Cr-Al, Al-Cr, Ni-Cr, Ni-Cr-Al.
3. Metals which were subsequently treated by:
   (a) Boronizing — Be, Ti, Zr, Si, V, Cr, Ni.
   (b) Siliconizing — Ti, V, Cr, Ni.
   (c) Carburizing — B, Ti, Zr, Si, V, Cr.

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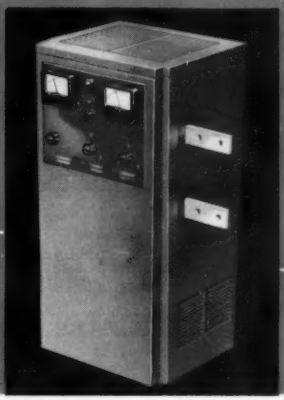

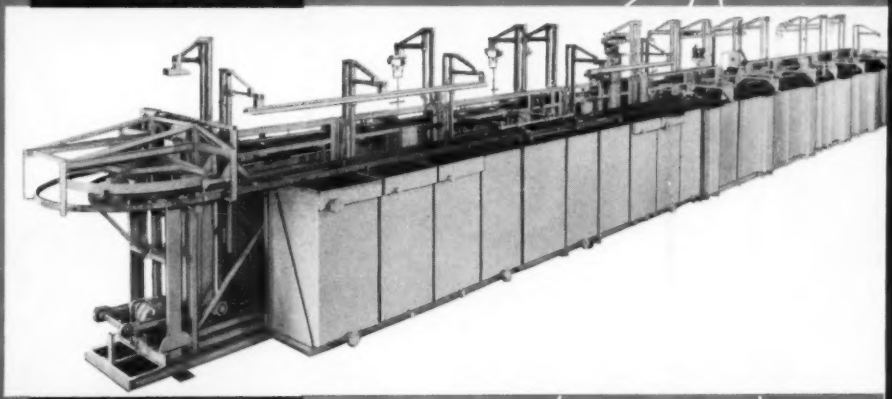

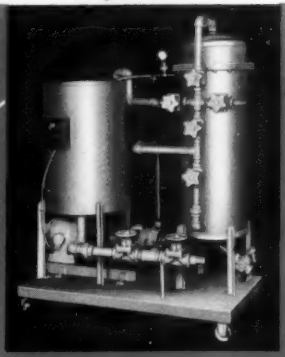

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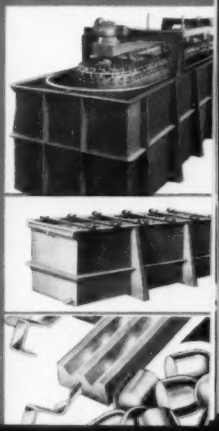

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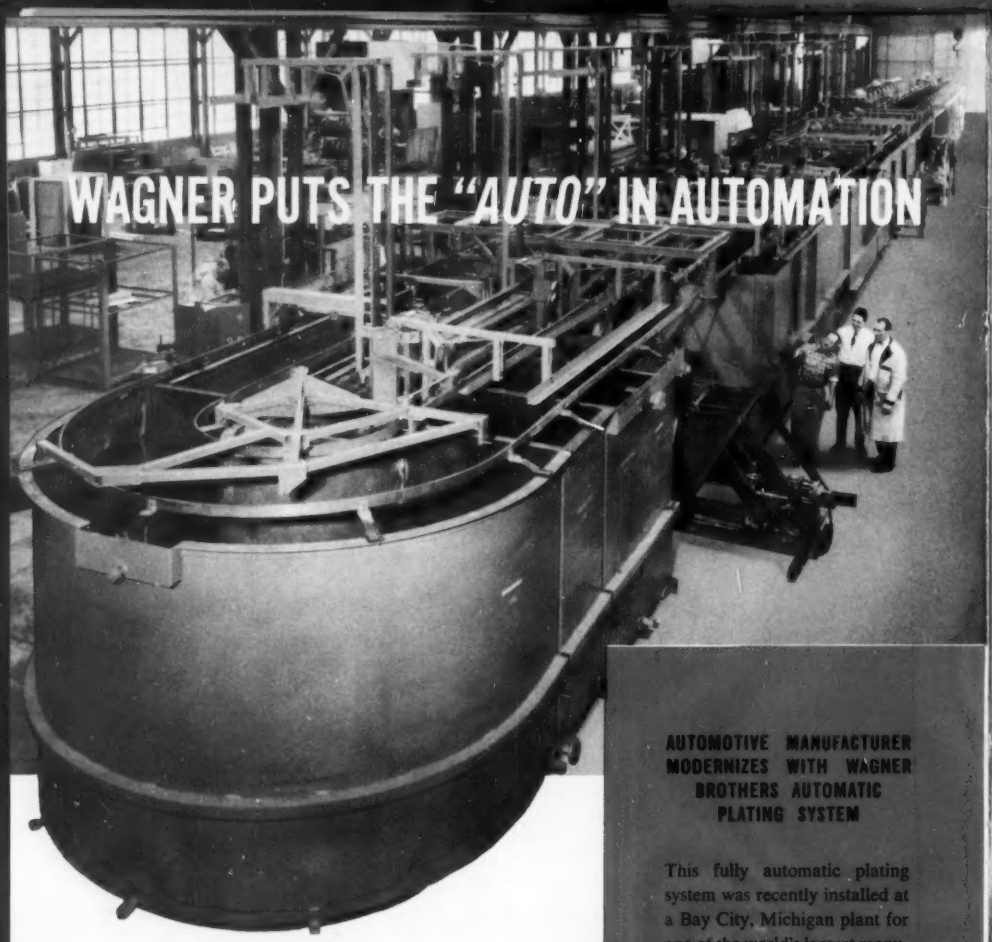

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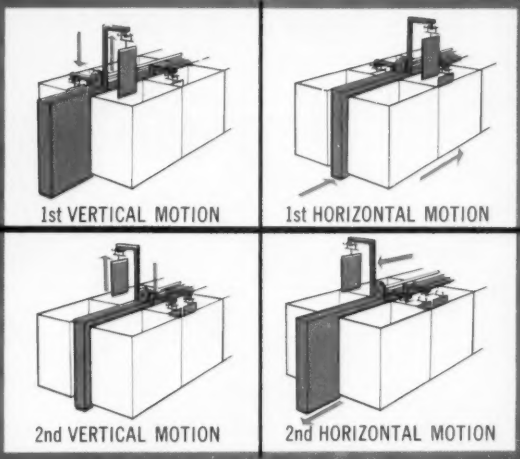

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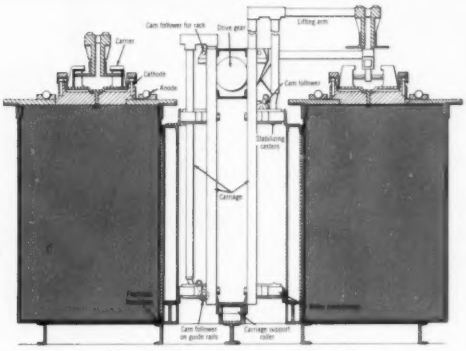

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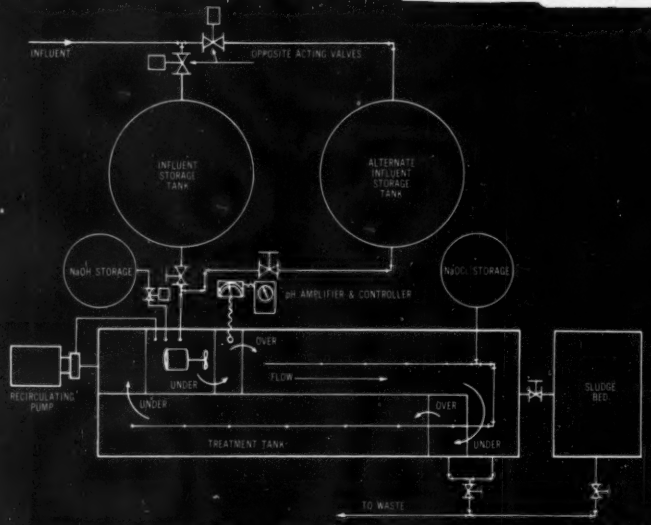

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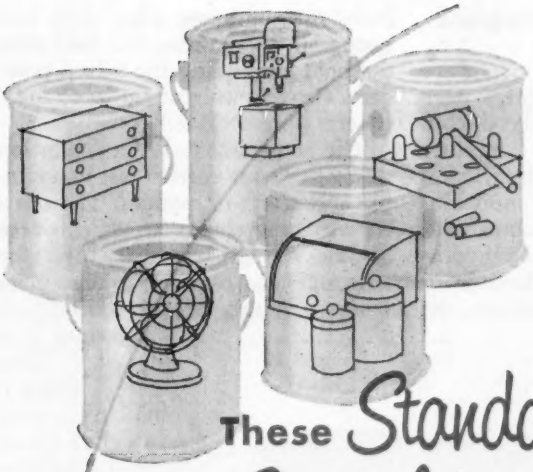

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The screening tests for oxidation resistance were carried out in a simple and effective manner. The coated wire was connected to a source of low voltage electricity and the wire and contacts enclosed in a glass tube through which dried air was passed at a rate of 6 liters per hour. Enough current was passed through the wire to raise it to the desired temperature which was determined by observing the wire with an optical pyrometer and correcting for the emissivity of the coating.

The range of 1650 to 2370 deg. F. was investigated. Incipient failure was detected by observing the condensation of molybdic oxide on the walls of the glass tube. Usually the wire separated within three minutes after the first evolution of oxide.

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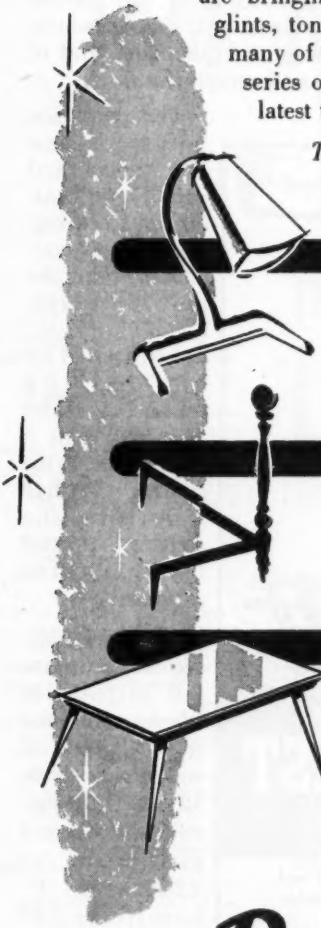
These are among the finishes we are introducing for this new era of beauty in the home!



CLEAR LACQUER for BRASS # 8000

Excellent performance in dip or spray application. Flawless adhesion on polished surfaces.

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Spray or dip application. Excellent adhesion.

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New additions to our Wood Lacquer line are a new Water White Clear Lacquer and a High-Solid Lacquer for cold application; rubs well, good cold check performance.

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Spotlighting Finishing Progress

The microstructure of all the coatings was examined and in all cases single phase and multi-phase zones were observed which correponded generally to the phase diagram for the system. In the case of chromium, which forms a continuous solid solution with molybdenum over the entire composition range, the solid solution zone was found to be covered by a layer of pure chromium. The authors note that if the rate of condensation of the metal reduced from the vapor phase exceeds the rate of diffusion into the molybdenum, the outer layer will consist of the pure metal, otherwise it would be a solid solution or compound of the metal and molybdenum.

The oxidation tests were done continuously and with cyclic heating and cooling. The authors concluded that the life of the molybdenum wire was not increased by any coating whose weight was less than 5 mg./sq. cm. With coating weights above this the coatings tested fell into three groups:

1. An immediate and substantial increase in life was obtained with coating weights of 5 to 12 mg./sq. cm. with silicon and zirconium at 2280 deg. F., beryllium at 1880 deg. F., and nickel-chromium (40/60)

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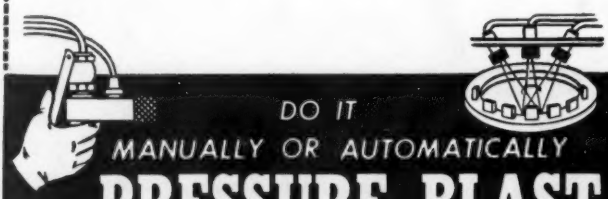
- ☐ True burrs
- ☐ Low drilling crowns
- ☐ Associated chips
- ☐ Light extruded metal
- ☐ Tool fuzz
- ☐ Gear teeth
- ☐ Deep holes
- ☐ Spirals
- ☐ Recesses
- ☐ Slots
- ☐ Threads



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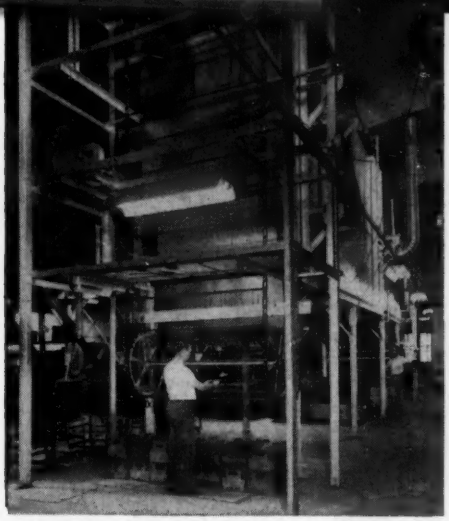
at 1780 deg. F. A substantial increase with a coating weight of 12 to 20 mg./sq. cm. was obtained with a titanium coating heated at 1830 deg. F., and some composite coatings heavier than 20 mg./sq. cm. (boronized Be, Ti, Zr) also showed extended life.

2. An intermediate prolongation of life at a coating weight of 12 to 20 mg./sq. cm. was observed with Cr, Cr-Al, and Ni-Cr (80/20) coatings heated from 1780 to 1830 deg. F., and titanium heated at 2200 deg. F.

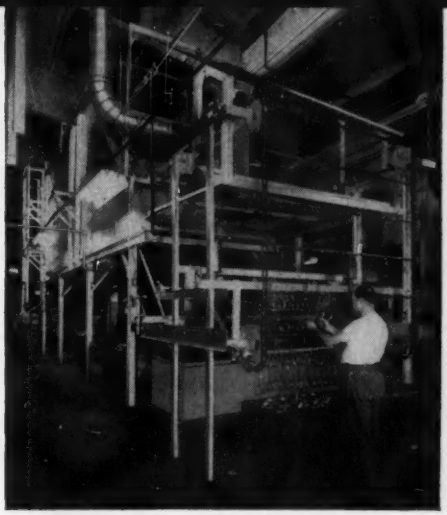
3. A small improvement at a coating weight above 20 mg./sq. cm. for boron, aluminum, and nickel coatings heated at 1830 deg. F.

In all cases the life of the wire decreased with increasing temperature. Silicon and zirconium-coated wires were outstanding at 2280 deg. F., with lives of 75 and 20 hours, respectively. Titanium and chromium-aluminum coatings were next best in the high temperature range. The life of the boronized metal coatings and one of nickel-chromium fell off more rapidly than those of Si and Zr in the range between 1830 and 2010 deg. F. B-Zr, Si-Ni, Ni-Cr, C-B, and Be coatings became only slightly effective between 1650 and 1830 deg. F., so that at 2200 deg. F. the Si-Ni coated wire lasted less than ½ hour, and the life of the others decreased rapidly at an even lower temperature range.

In the cyclic heating tests it was found that the life of the coating varied with the length of the wire for lengths less than 15 cm. and with



Charging end of finishing system. Parts dip quickly into paint tank then begin three passes through oven.



Unloading station. Note how oven utilizes ceiling space, leaving floor free for operators and storage.

Kirk & Blum Oven and Finishing Installation

INCREASES PRODUCTION 92%
SAVES 82% IN PAINT

. . . K-D LAMP COMPANY, CINCINNATI, OHIO

Before installation of this KIRK & BLUM system, maximum finishing production of small stampings and castings was 26,000 parts in 8 hours. Now, with the same operators, production is 50,000 parts in 8 hours. In addition, dip painting gives a better, more uniform finish and saves up to 82% of the paint formerly used in spraying.

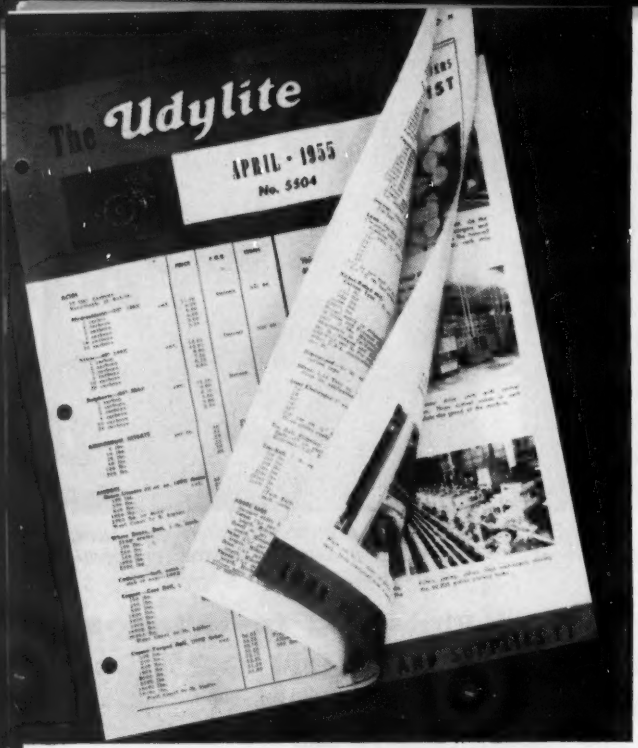
This oven, despite its size, offers simple operation. Conveyor carries cross bars on selected centers up to 32 inches, depending on work size. The parts are loaded by the operator . . . dip into the caster-mounted interchangeable paint tanks, then make three horizontal passes inside the oven. Foamite fire protection is built-in.

The KIRK & BLUM Oven is direct gas fired, recirculating type, automatically controlled. The cycle can be varied from 1 to 2 hours. This speed control gives wide variation in the types of finishes which can be used.

This KIRK & BLUM installation is the ninth at this plant, ample evidence of complete satisfaction. Other installations include: 3 paint oven systems, fume exhaust system, 1 dust control system.

Whatever your industrial needs, consult KIRK & BLUM. Write for catalog on Industrial Ovens. The Kirk & Blum Mfg. Co., 3116 Forrer St., Cincinnati 9, Ohio.

KIRK AND BLUM OVENS



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A lot of profits can roll out the back door of your plating shop if you fail to keep up-to-date on prices of the hundreds of items you use every day. That is why Udylite, as another of its many free services to electroplaters, publishes the Price Guide—a monthly price listing of important items regularly used by the trade, as well as information about new developments in equipment and processes.

It pays to buy supplies from Udylite—you can be sure of top quality, accurate weight and pricing—that Udylite stands back of every sale. You can be sure of prompt delivery too, as Udylite has widespread warehousing service.

The Udylite Price Guide has become an important tool for thousands of electroplaters. If you are not receiving your copy now, send us your name and address and it will soon reach your desk on the first of each month.

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DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

the diameter of the wire when it was less than 0.10 cm. For reproducible measurements, therefore, it is necessary that the dimensions of the specimens exceed these values. Cyclic heating and cooling drastically reduces the life of the coating compared to its value under continuous heating. The ratio for continuous to cyclic life for Si, Zr, and Al coatings was 13.2, 19.8, and 23.7 respectively.

As a result of metallographic studies and weight loss measurements, the authors were able to identify three distinct stages in the gradual breakdown of a coated molybdenum wire undergoing oxidation during cyclic heating. The first is a quiescent stage in which oxidation occurs slowly and differential strain results from alternating thermal expansion and compression. The second stage is characterized by evolution of molybdic oxide during the first 1 to 10 seconds of each heating cycle. The authors state that this is due

to the formation of capillary fissures during the first stage. Air enters these fissures, permitting oxidation of the molybdenum. The capillaries soon become sealed by the reaction products of the molybdenum oxide with the surrounding coating, but are reopened by contraction during cooling. In the last stage there is a continuous evolution of molybdic oxide which permeates the capillaries. During this last period the capillaries have been so enlarged by attack of the molybdenum oxide that the "slag" formed is no longer effective in blocking them. In the last minute of life a hot spot develops, usually in the middle of the wire, which finally ruptures.

The complex mechanism of destruction of coated molybdenum under cyclic heating indicates that where the actual service will be under cyclic conditions, testing under continuous heating conditions may not yield the required information.

ASK THE COMPANY WHO OWNS THEM

New Packard Plant Uses Three Udylite Plating Machines in Modern, Efficient Manufacturing Lines

At the Packard Motor Car Company's new, modern Utica, Michigan plant, three Udylite Junior Full Automatic metal finishing machines are processing parts on three feeder lines that deliver components to the final assembly line. The machines are placed right in the flow of work without the necessity of a special plating room.

These Udylite machines are used for Lubrite of camshafts (above); tin plating pistons (lower left); and anodizing of miscellaneus parts (lower right).

The Udylite Junior Full Automatic is ideal for any production line. There is no need of moving parts from a line to a remote plating department and then back to the line.

The Udylite Junior will give you high production capacity with a minimum of floor space. It's portable—easily moved when you change your plant layout. But best of all, its cost is low.

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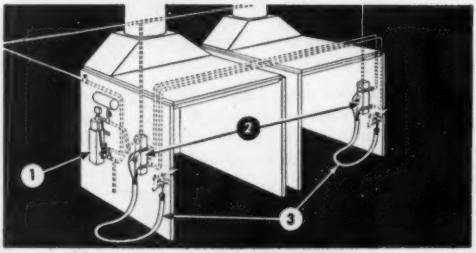
Plumbers Woodwork increases

The Plumbers Woodwork Co. manufactures wood and plastic Badger Brand *toilet seats.*

This one DeVilbiss master heater serves all four spray stations at Plumbers. To add another station, a low-cost heat exchanger, gun, and hose are all that are needed!



DeVilbiss hot-spray system is foolproof; adapts to multiple gun hookups. Heated water from master water heater (1) heats paint in heat exchangers (2); heat-jacketed hose assemblies (3) keep paint hot right up to guns, assuring uniform viscosity at all times at each gun.

SPRAY GUNS • AIR COMPRESSORS HOSE AND CONNECTIONS

paint mileage 94% with new DeVilbiss paint heater

"Since installing a DeVilbiss hot-spray system, production costs have been cut remarkably, and we're getting a better paint job," says Fred Mueller, president of Plumbers Woodwork Co., Algoma, Wisc. "With one coat, we get complete coverage – faster drying, and a tougher, glossier finish.

"Paint stays hot right up to the guns, and we add no thinner. Overspray has dropped to a fraction of that of our former cold-spray method. Now, we apply pure paint to our wooden seats – without runs or discoloration.

"What's more, the DeVilbiss paint heater lets us reduce air pressure by two thirds – providing big savings in power, equipment replacement, and maintenance. Even more impressive, however, are spray-material savings. For now, one gallon of paint covers 97 pieces, compared to 50 pieces with cold spray – an increase of 94% in paint mileage!"

Why not call a DeVilbiss representative, today, to survey *your* finishing operations–show you the way to *better* finishing at *lower* cost? The standard components of the DeVilbiss paint-heating system can be combined in countless ways to meet your special needs.

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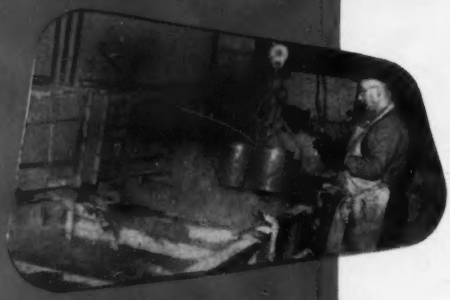


CLEANING

PLATING

FINISHING

New • EQUIPMENT • MATERIALS • PROCESSES

Lining Compound

The introduction of a corrosion-resistant neoprene lining compound that flows on like paint to a variety of industrial surfaces — fan blades, fume ducts, process vessels, pump impellers, valves and piping — has been announced by the Pennsylvania Salt Manufacturing Co. The product, called Pennsalt NeoLine, combines the corrosion resistance of neoprene with excellent strength and adhesion. NeoLine cures completely to a live, resilient vulcanized coating for full protection of metal, concrete or wood where a heavy duty coating or lining is required. It can be heat or air-cured.

The manufacturer states that NeoLine can be applied to irregular shapes and surfaces as well as plain surfaces. Its flow qualities permit application by brush, roller, spray or dip methods.

Tests show a wide range of resistance to corrosives up to 200 deg. F.

NeoLine exhibits long storage life. Curing accelerators for the coating are packaged separately and are mixed with the NeoLine just prior to application. A choice of accelerators is available for various methods of applying NeoLine.

Among the uses for the product are immersion service in caustic soda and other strong alkalies; salt and brine solutions; acid, alkaline and neutral salt solutions, vegetable oils and greases, and a variety of other acids and organics.

Complete specifications are available from the Corrosion Engineering Dept.,

Pennsylvania Salt Manufacturing Company, 1013 Widener Building, Philadelphia 7, Pa., or by circling No. 1 on Reader Service Card inside cover.

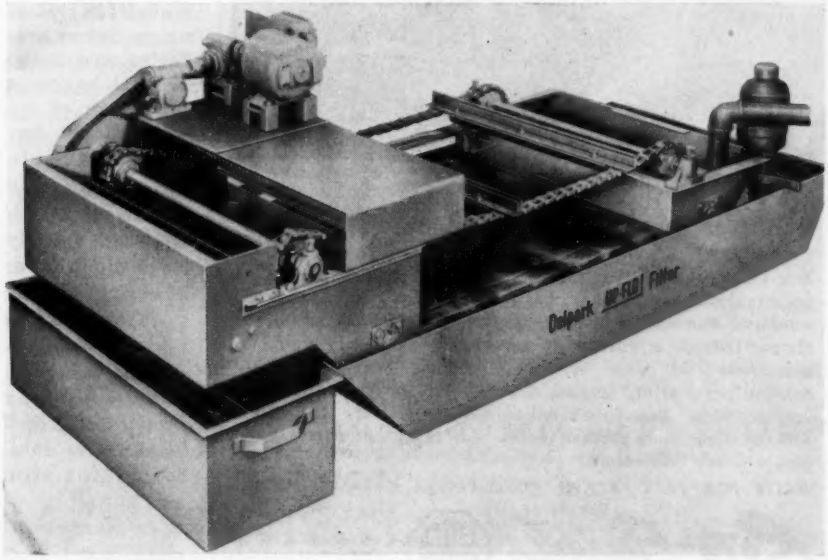
★ ★ ★

Solution Filter

An automatic, self cleaning filter which can be used to filter fine as well as coarse particles from a liquid through a permanent filter medium has been announced by the Industrial Filtration Co., Lebanon, Indiana.

Called the Delpark Up-Flo Filter, it uses gravity to remove the heavier solids before filtration of the liquid through a horizontal bar-type screen. Only the fine particles held in suspension reach the screen. The efficiency of the filtration process is never impaired by deposits, the manufacturer states.

Chain driven flights operating on a time lapse sequence pass under the



Delpark Up-Flo Filter

filter and remove deposits from the underside of the screen and the area beneath the screen. These flights carry the particles to a device which cleans the flights. Filtered swarf drops into a tote box for disposal.

The Delpark Up-Flo Filter is available in all sizes and capacities. For further information, write George L. Guymon, vice president, Industrial Filtration Co., Dept. U-312, 166 Industrial Ave., Lebanon, Indiana, or circle No. 2 on Reader Service Card inside back cover.

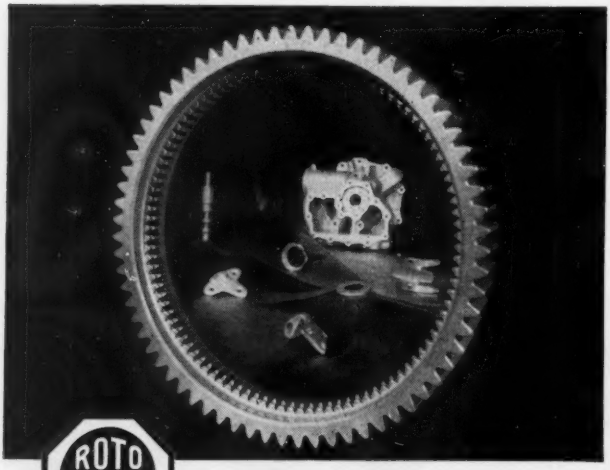
★ ★ ★

Cleaner-Deruster

Oakite Products, Inc., has announced the development of Oakite Compound No. 131, an acid detergent designed primarily for pickling and scale removal operations. This material is reported to remove light to moderate rust, heat scale, tarnish, and other oxides, as well as normal shop dirt; and to meet specification MIL-M-10578A, Type III.

Oakite Compound No. 131 is a non-viscous, amber colored liquid product having a pH range of 1.5 to 1.0 at 70 deg. F., and a bulk density of 11.0 pounds per gallon. It is completely soluble in water or alcohol in all proportions, and is said to possess excellent rust and soil removing properties as well as effective inhibition for iron and steel.

The cleaner rinses easily in both hot and



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Roto-Finish maintains exact tolerances on precision parts with no significant dimensional changes. It makes possible a wide range of finishes applicable to parts of almost any size or shape; finishes a variety of materials — at big savings in manpower and costs. Without obligation, send sample unfinished parts to us. Include finished part for guide and your specifications. Roto-Finish will finish parts in its laboratory. You get a complete process report. You are guaranteed results and a finish that counts!

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SC Solvents Chemicals Group Member

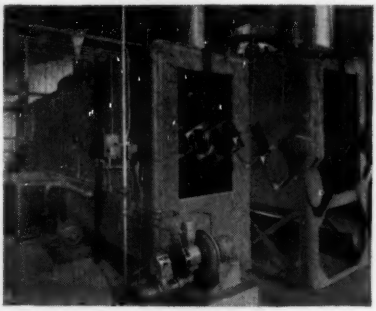
cold water. It may be used in a concentration range of 5 to 30 per cent by volume, with solutions made by stirring the Oakite Compound No. 131 slowly into the full volume of water. Recommended operating temperatures range from room temperature to 160 deg. F.

Additional particulars are available from Oakite Products, Inc., 120 Rector St., New York 6, N. Y., or by circling No. 3 on Reader Service Card inside back cover.

★ ★ ★

Metal Cleaning Machine

A metal cleaning machine recently installed in the Cincinnati plant of the Buckley Manufacturing Co., although specifically built to handle production requirements of the present, has adequate provisions for anticipated future requirements.



Parts for air conditioner cabinets entering metal cleaning machine

Engineered by The Cincinnati Cleaning & Finishing Machinery Co., the machine includes washing, phosphate coating, chromic acid rinse and drying stages, all parts being handled on a monorail conveyor. The machine now handles air conditioner cabinets and parts, with a maximum size of 36 by 18 inches. The tunnel opening is of corresponding size. Provisions have been made for handling cabinets up to 55 by 36 inches, that is, the tunnel opening can be increased to that size, and spray and drying nozzles, extra tank and pump capacity, and so on are already in place, ready for future use.

The machine is 91 inches in length, arranged in a U-shape to form a compact unit 47 feet long. It is 14½ feet

ELIMINATE COSTLY REJECTS IN YOUR FINISHING DEPT. WITH DETROIT "TAC" RAGS

DETROIT "TAC" RAGS are an absolute necessity for cleaning any metal, wood or plastic surface before painting. Removes all dust, lint and sanding particles. Order today through your supplier.
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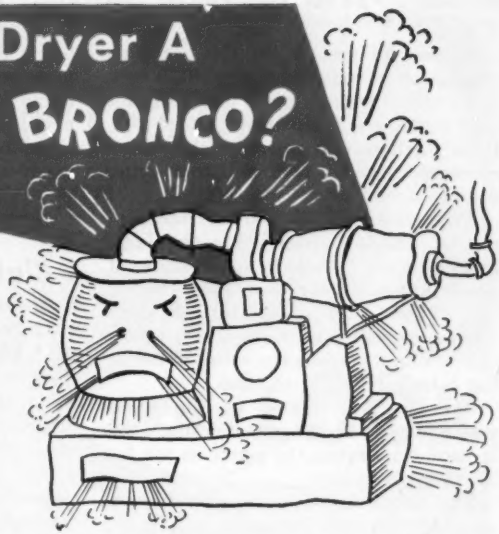
Is Your Dryer A BUCKING BRONCO?



In order for a centrifugal dryer to stay put it should be heavy. That's why the modern Nobles Dryer is about twice the weight of most dryers. Extra weight is one of the reasons for its stability, its freedom from vibration, its smooth operation, and long trouble-free life.

It's all new in design and principle. A powerful suction fan *draws* the air completely through this modern Nobles Dryer and exhausts it at the bottom! Electric or steam heaters are mounted in the cover of this machine of advanced design for a saving of space and elimination of heat loss.

Air moving equipment isn't an extra. The powerful suction fan is an integral design feature of each machine. A brake pedal extending around the entire work area controls an internal, expanding hydraulic brake for quick, smooth stops.

Why not take the first step now toward modern quick drying and lowest costs?

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high and 14 feet wide. The separate stages are as follows: approach, 6 feet; hot wash, 5 feet; drain, 8 feet; chromic acid rinse, 2½ feet; drain, 6 feet. Following these operations, the parts emerge, travel 12 feet, and then enter a 20 foot hot air drying section.

The solution tanks on the machine are of ample capacity for the large pumps used. Heated by submerged, gas fired tubes, each tank has a Cincinnati Type D Recirculating System. This system, which removes entrained contaminants, keeps the solution usable for a longer period of time.

To effect economy in operation, waste heat from the tank heating units is used for drying the parts in the hot air blowoff section.

The monorail through the machine operates at approximately 5 feet per minute, giving a production capacity of 300 to 600 cabinets and parts per hour. Further details on the machine may be obtained by writing The Cincinnati Cleaning & Finishing Machinery Co., Inc., 2008 Hageman St., Sharonville, Ohio, or by circling No. 4 on Reader Service Card inside cover.

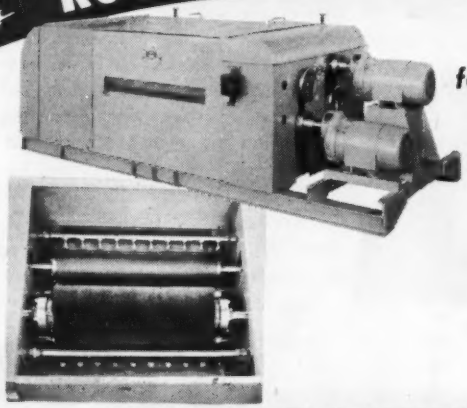
★ ★ ★

Rigid Polyvinyl Chloride

Kaykor Industries, Inc., has announced the availability of Vyflex Rigid Polyvinyl Chloride Plates (1/16 to 1 inch thick), sheeting 0.012 to 0.025 inch thick, and other special forms. Made from completely unplasticized and unmodified polyvinyl chloride, it is free from fillers and processing aids, assuring corrosion resistance and high strength.

In addition to all standard methods of fabrication for thermoplastic mate-

ROCKWELL Brushing Machine



for METAL STRIP or SHEET

- Removes scale, burrs, scum or dirt.
- Polishes or produces other brushed finishes.
- May be used as individual equipment or as an integral part of a continuous heating, cleaning and drying process.
- Built to your requirements.

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Lasts Years Longer—Exclusive Singleton Fusion-Welded "H-T Sincolite"—permanent, no leak seams. No deterioration, no maintenance, won't wear out. **The finest at the lowest price!**

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rials, Vyflex Rigid Polyvinyl Chloride can be fabricated by hot-gas welding, which makes possible the construction of complex units and structures such as fume exhaust systems, acid tanks and other equipment or parts exposed to severe corrosive conditions.

For further information and specifications write Kaykor Industries, Inc., Yardville, N. J., or circle No. 5 on Reader Service Card inside back cover.

★ ★ ★

Automatic Plating Machine

Details of the Stevens "Stevadoer" Automatic Heavy-Duty Plating and Processing Machine have been announced. This side arm type machine was designed to automatically load and unload. It can be adapted to single or double row plating and processing and was engineered to handle a wide range of rack sizes and weights. The height and floor space required is relatively small.

The Stevens delayed set-down mechanism which provides independent timing in one or more tanks can be provided. The Stevadoer is mechanically flexible, and additional transfers can be provided. Through the use of a special timer control, a carrier arm can be made to skip any tank or operation, as desired.

Safety and accessibility are also featured. A 20 inch or wider cat walk can be provided between processing tanks and the mechanism on two-row machines. This permits safe addition and removal of anodes, lubrication and inspection. No moving mechanism is over the solutions and all internal mechanisms are built below tank level.

All lift and horizontal motion of the "Stevadoer" is accomplished by hydaulic power. Special controls permit independent adjustment of acceleration and transfer speeds to accommodate extremes of weight and rack size.

Additional information on the Stevadoer may be obtained by writing

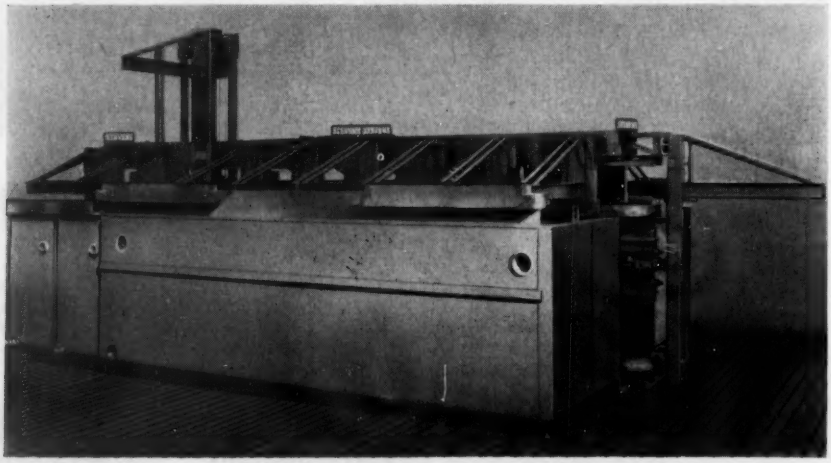
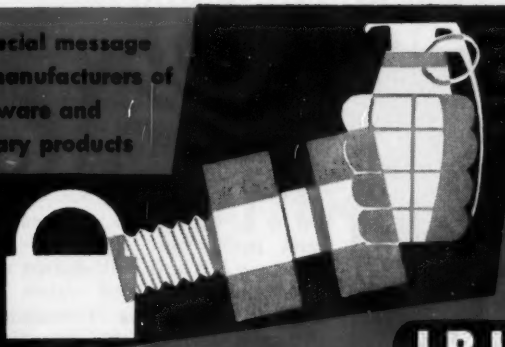


Fig. 1—Stevens Automatic Plating Machine with arms in plating position.

a special message for manufacturers of hardware and military products



need a specification finish for protection, identification, decoration? specify

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Specify Iridite . . . to meet military specs for corrosion protection during use or storage . . . for paint adherence . . . for low cost color coding . . . or to add quality and sparkle to your products. Here's how you can use Iridite:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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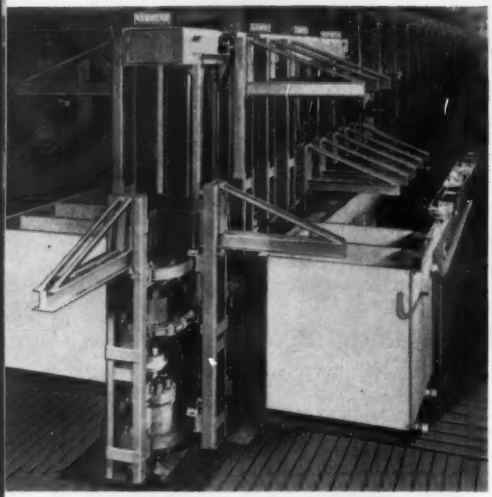

Fig. 2—Load end view of the Stevens "Stevadoor" automatic plating and processing machine showing some arms in elevated delayed set-down position.

Frederic B. Stevens, Inc., Detroit 16, Mich., or by circling No. 6 on Reader Service Card inside cover.

★ ★ ★

Rust Remover

A non-acid rust removing material that simultaneously strips paint, rust and primer from ferrous metal surfaces has been developed by Turco Products, Inc. Called Rustgon, the liquid alkaline material requires only two steps—a dip and a pressure rinse.

The manufacturer points out that the Rustgon method of rust, paint and red oxide primer removal eliminates the need for multi-tank installations. Parts to be de-rusted and stripped of paint and primer are immersed into the Rustgon hot tank, withdrawn, and then rinsed with air and water, or with steam. Ingredients formulated into Rustgon decrease the re-rusting tendency. There are no corrosive fumes evolved in the process.

For further data, write Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif., or circle No. 7 on Reader Service Card inside back cover.

★ ★ ★

Ultrasonic Cleaner

An ultrasonic device designed for cleaning and degreasing large and small metal parts, even delicate foils and the tiniest watch movements, has been introduced by the Curtiss-Wright Corporation, Wood-Ridge, N. J.

With the Curtiss-Wright unit, cleaning and degreasing is accomplished by immersing the material in a mild, warm solvent and subjecting it to intense ultrasonic irradiation. Millions of surging cavitation and air bubbles break loose dirt particles, even from

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BETTER FINISH

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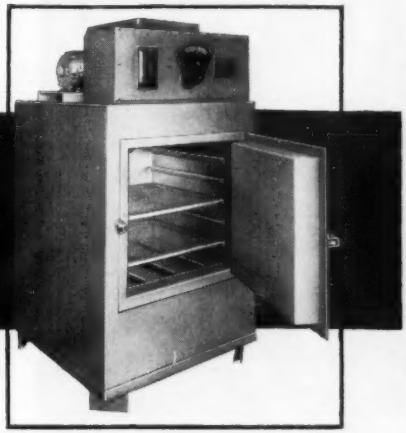

OVENS for all purposes . . assuring accuracy, speed and engineering performance. Oven requirements for your particular use. Automatic controls assure exact baking conditions, finer finish and quicker drying.

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inaccessible contours, the manufacturer states.

Although the unit is primarily designed for foils, delicate gears, watch movements, ball bearings and other hard-to-handle small metal objects, the same principle is applicable in bigger models for use with larger pieces.

For further data circle No. 8 on Reader Service Card inside back cover.

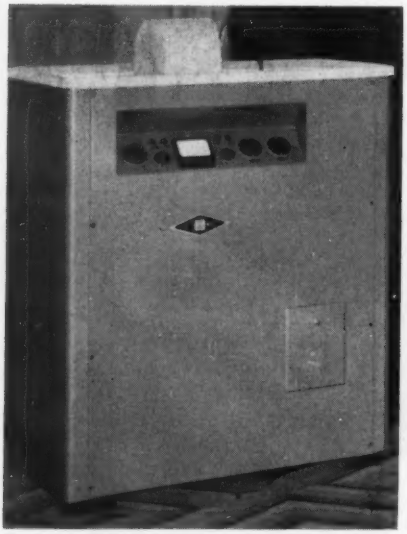


Fig. 1—Heavy-duty ultrasonic washer for larger parts or sub-assemblies

★ ★ ★

Tack Cloth

The Klix Tack Rag, designed for final cleaning of surfaces just prior to finishing, has been announced by Grenco Mfg. Co., West Orange, N. J. Made of durable gauze mesh, impregnated with chemicals which are non-drying, and thus cause permanent "tackiness," the cloth is effective for cleaning surfaces of loose dirt, dust, lint, and grinding and sanding residues, the manufacturer states.

For further information, write Grenco Mfg. Co., 47 McClellan Terrace, West Orange, N. J., or circle No. 9 on Reader Service Card inside back cover.

★ ★ ★

Epoxy-Based Coating

Dennis Chemical Company has announced the development of Perma-Skin Epoxy Coatings, based upon the use of catalysts to provide, in an air-dry system, properties comparable to those obtained with high temperature baking. This permits coatings of items too large or otherwise impractical to

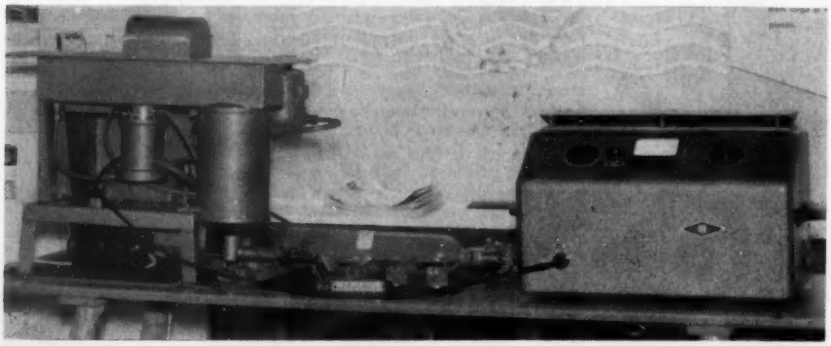
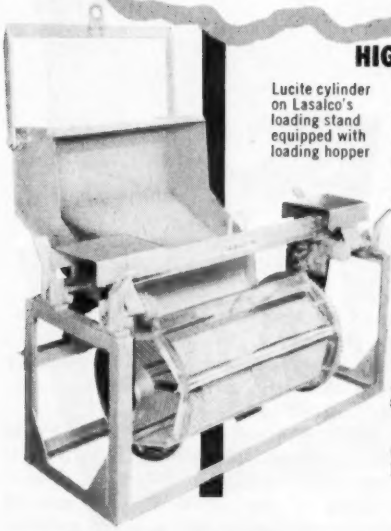


Fig. 2—Bench-mounted ultrasonic cleaner for small or delicate parts

Does The Complete Plating Job In A Single Cylinder!



Lucite cylinder on Lasalco's loading stand equipped with loading hopper

HIGH TEMPERATURE LUCITE CYLINDER

- Eliminates work transfers—carries the work from start to finish—speeds up plating operations—lowers production and equipment costs
- Remains impervious to all usual plating solutions
- Lasts indefinitely when used in temperatures up to 170°
- Full length 1-piece negative connection gives perfect contact. Heavy dangler imbedded in load
- Negative contact can be arranged to carry up to 800 amps.
- Quick, unobstructed loading and unloading. One-piece door has instantly removable positive-locking clamps
- Rugged construction of ½" thick Lucite. Annealing after assembly prevents all internal stress
- Capacity up to 150 pounds

Cylinders available in 24", 30", 36" and 42" lengths. Inside diameters 12" or 14" across flats.

BARREL PLATER

with LUCITE CYLINDER

- Knife switch contacts are entirely self-cleaning when cylinder is lowered into place.
- Cylinder knife switches insulated and protected by guard from overhead drippage.
- Multiple units for tackle hoist operation. Single units either tackle or hand hoist.
- Motor-driven gear drive has 3-speed selector for 2-4 and 6 r.p.m.
- Nothing plates but the load! A real money-maker that does a better job in less time at lower cost.

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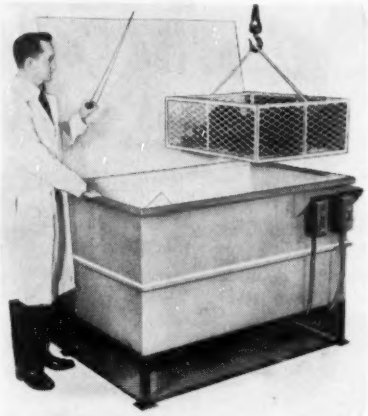
bake, such as chemical process equipment, water towers, and tanks. These coatings are also recommended for protection of floors against heavy traffic and corrosive spillage. They feature excellent adhesion, abrasion resistance, toughness, flexibility, acid and alkali resistance, and solvent resistance, it is claimed. Complete data is available upon request to Dennis Chemical Company, 2701 Papin St., St. Louis, Mo., or by circling No. 10 on Reader Service Card inside back cover.

★ ★ ★

Parts Washer

Storm-Vulcan, Inc., Dallas, Texas, has announced an addition to the line of Turbo-Blast parts cleaning machines. This machine is Model No. 40, which is designed for utilization of a small working area, with volume cleaning capacity.



Model No. 40 Parts Washer

This parts cleaner is only 40 inches from the floor, which facilitates loading and unloading.

Model No. 40 Turbo-Blast Parts Cleaner has a tank size of 5 by 3 by 2 feet (solution fills to 18 inches deep); heating of the solution is by gas or steam; solution capacity is 185 gallons; impellers are driven by two 1½ h.p. single phase motors.

Complete information is available from Storm-Vulcan, Inc., 2225 Burbank St., Dallas, Texas, or by circling No. 11 on Reader Service Card inside back cover.

★ ★ ★

Indicating Temperature Control

Model LD-1S Burling Indicating Temperature Control has been announced by the Burling Instrument Co., Chatham, N. J.

Several adjustable temperature ranges are offered, including 150-750 deg. F. Control is obtained by the differen-

P.R. (Periodic Reverse)

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Burling Indicating Temperature Control

tial expansion of two concentric tubes actuating a snap action switch through a lever. The switch is rated at 15 amperes, 125-250 volts, a.c. Operating differentials are from plus or minus 1 to 4 deg. F., depending on conditions.

This control is for local mounting, and may be furnished with flange or threaded fittings. Tube is of brass or stainless steel, ⅝ inch outside diameter by 14 inches long. Instrument head measures 5 by 1¾ by 2½ inches, exclusive of knob and thermometer dial. For further information, contact Burling Instrument Co., 16 River Rd., Chatham, N. J., or circle No. 12 on Reader Service Card inside back cover.

★ ★ ★

Chemical Resistant Filter Pump

A filter pump constructed of materials which are resistant to attack by plating solutions, such as chromic and fluoboric acids, has been announced by the Sethco Manufacturing Co., Brook-

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PIONEERS IN ENGINEERING, MANUFACTURE AND INSTALLATION OF

INDUSTRIAL OVENS
SPRAY BOOTHS
PARTS WASHERS
DUST COLLECTORS
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SCIENTIFICALLY DEVELOPED, TIME TESTED, for High Resistance to CORROSION...

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★ *A Low-Cost Maintenance Coating*

A reliable, long life, plant and equipment protective coating, highly resistant to corrosive fumes, oil, splash and weathering. It is easily applied, quick drying and can be used economically on new and old cleaned surfaces of metal, wood or concrete.

This tough, resilient, chemical resistant and high thickness coating has a good maintenance protection record on tank exteriors, ducts, structural steel, and general plant equipment, floors, stairways, etc., when applied in 3 coats at a unit coat thickness of 2 to 3 mils. Available in black or light gray.

♠ A

A Perma-Line

♦ No. 124 ACID-RESISTANT PAINT

★ *APPLY WITH BRUSH OR SPRAY*

This non-contaminating, easy to keep clean, synthetic resin base, solution type coating has gained wide acceptance — where ordinary paints corrode from acid and alkali fumes and spillage. Used by chemical, pickling, petroleum, plating, food and beverage plants, etc. Easily applied by brush or spray to wall surfaces, structural work, machinery, exterior surfaces of hoods, ducts and processing equipment. Needs no primer, 2 coats generally give complete coverage. Available in green, white, gray and black.

(Not recommended as inside membrane lining for acid storage, plating or pickling tanks or as a floor finish).

♦ A

PERMA-LINE QUALITY PRODUCTS COMBAT CORROSION IN MANY INDUSTRIES

Perma-Line corrosion specialists are experienced in helping various industries successfully combat their particular corrosion problems, and in planning new installations.
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lyn, N. Y. Several sizes and models of this pump are available. Sethco Filter Pumps VHI-5 and VHI-10, rated at 50 and 100 gallons per hour, respectively, are equipped with Hastelloy C pumps and fittings, and rigid unplasticized polyvinyl chloride filter assemblies. Hastelloy C Alloy is a nickel, molybdenum, chromium, tungsten, iron alloy, and is resistant to a wide variety of chemicals. The rigid P.V.C. filter assembly offers complete resistance to any electroplating solution, the manufacturer states.

Motors furnished with the VHI series are totally enclosed, ball bearing, 110 volt, 60 cycle, single phase type. Pump, filter assembly and motor are mounted on a corrosion resistant phenolic base with casters for portability. Units come equipped with 10 foot lengths of chemical inlet and outlet hoses. A plastic strainer is furnished with the inlet hose.

Model VHI-10 Filter Pump

The Sethco LHI series, rated at 50 to 100 gallons per hour, is identical to the VHI series except that the filter assemblies are fabricated of a high temperature clear plastic. They cannot be used for filtering chromium plating solutions, but are suitable for other plating solutions.

For further data circle No. 13 on Reader Service Card inside back cover.

★ ★ ★

Solution Heater

The Rempe Company, Chicago, Ill., has announced a line of heaters called "Hi-Therm Grid Heaters" for heating solutions in plating tanks, rinse tanks, cleaning tanks, and other fluid heating applications.

These heaters feature a large amount of heat transfer surface in a limited space. The cross sectional width is 2¾ inches. The staggered arrangement of the tubes accelerates fluid motion and heating efficiency by its high conduction and convection factors.

The Hi-Therm Grid Heater can be used horizontally or vertically, or on the bottom of a tank if desired. It is

TRUE BRITE
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- Each strip identifies itself.
- Packed in transparent pocket-sized case.
- Easy to use—simply match color of indicator bar with corresponding constant color bar.
- A range for every purpose.

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the finest strippers of all

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"Step right up Gentlemen, you ain't seen nuttin' yet." And you haven't until you've seen Northwest's Strippers in action. These high-speed babies really "peel" organic finishes. Built to cope with all types of paints on metals or plastics—Northwest Strippers give you a clean surface ready for repainting in one run-through.

Northwest Strippers are Safe—no fire hazard, no odor, no fumes, non-toxic. Northwest Strippers are Sure—parts are fully cleaned—metal surfaces are unharmed—long life is assured—economy is proven. Northwest Strippers are Soluble—film is converted into a form which can be rinsed off with water spray—contains no chemicals which can't be flushed through sewers.

Call your Northwest Cleaning Specialist for the right stripper to do any job.

Remember—YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER

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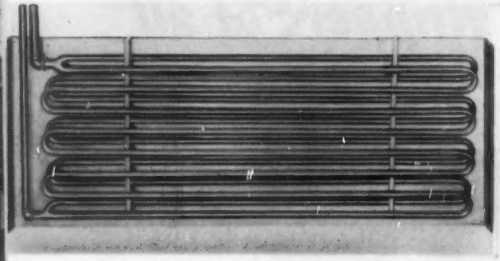
pioneers in pH cleaning control serving you since '32



Hi-Therm Grid Heater

furnished in a standard height of 31½ inches, in any length, to the user's specification. Fabricated from wrought steel pipe, it is tested to 350 pounds pressure. For special applications, it may be fabricated from other ferrous or non ferrous metals.

Full details may be obtained by writing the Rempe Co., 340 N. Sacramento Blvd., Chicago 12, Ill., or by circling No. 14 on Reader Service Card inside back cover.

★ ★ ★

Cold Dip Plastisol

Unichrome Plastisol Compound 4129 has been announced by the Organic Coating Division of United Chromium, Inc. Formulated with flow characteristics which allow it to be applied in more practical thicknesses and with greater speed of application, the material offers a protective coating against abrasion and corrosion. The material is being used to finish baskets and shelves in refrigerators and freezers.

Unichrome cold dip plastisols are applied to parts at room temperature over a special primer which requires a short bake at 350 deg. F. The coating itself is cured by baking at 350 to 365 deg. F. for 20 to 30 minutes. Dipping speeds of 17 or 18 inches per minute are possible on automatic conveyor equipment, the manufacturer states.

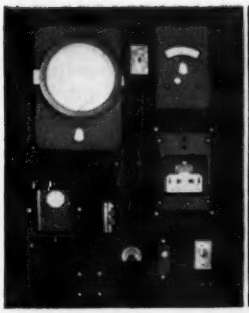
For further information, write United Chromium, Inc., 100 E. 42nd St., New York 17, N. Y., or circle No. 15 on Reader Service Card inside cover.

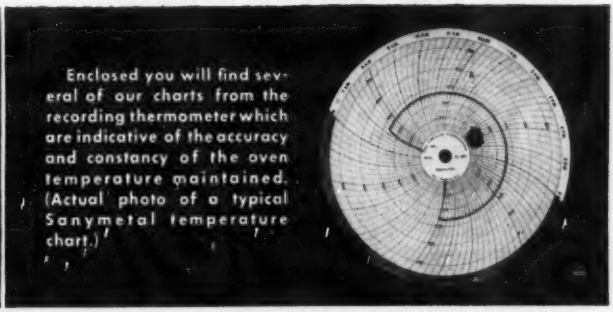
★ ★ ★

Wet-Type Dust and Fume Collectors

Van-Truer Company, Inc. has announced the development of a wet-type

Freezer baskets and shelves being dipped in Plastisol Compound 4129




Enclosed you will find several of our charts from the recording thermometer which are indicative of the accuracy and constancy of the oven temperature maintained. (Actual photo of a typical Sanymetal temperature chart.)

Here's **Visual Proof** of **Constant Oven Temperature Control...**

Mr. K. W. Benham, Vice President of The Sanymetal Products Co., Inc., writes, "We are sure you will be interested in knowing the results we have experienced in the use of the oven we purchased from you in 1953.

"We are using this oven for baking finishes on metal toilet compartments, using twenty-two standard colors in the pastel shades. Many of these colors range from a white to light creams and ivories and due to constant even temperatures we have experienced highly satisfactory results in getting uniform color and complete baking.

"We are very well satisfied with the equipment and the service given us by your company."

The Sanymetal Products Co., Inc.

TOILET COMPARTMENTS
Suspended Cutting Systems

RESERVE ROAD AND NICKEL PLATE R.R. • CLEVELAND 14, OHIO

February 8, 1955

The Lanly Company,
760 Prospect Ave.,
Cleveland, Ohio.

Gentlemen:

We are sure you will be interested in knowing the results we have experienced in the use of the oven we purchased from you in 1953.

We are using this oven for baking finishes on metal toilet compartments, using twenty-two standard colors in the pastel shades. Many of these colors range from a white to light creams and ivories and due to constant even temperatures we have experienced highly satisfactory results in getting uniform color and complete baking.

Enclosed you will find several of our charts from the recording thermometer which are indicative of the accuracy and constancy of the oven temperature maintained.

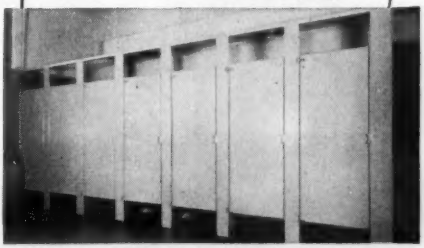
We are very well satisfied with the equipment and the service given us by your company.

Very truly yours,

THE SANYMETAL PRODUCTS Co., Inc.

By K. W. Benham - Vice President

KWB:ed
enc.



A typical battery of Sanymetal Toilet Compartments

You too can do a better job with LANLY finishing ovens

WRITE FOR THE CATALOG

LANLY
FINISHING OVENS
THE LANLY COMPANY • 760 PROSPECT AVE
CLEVELAND, OHIO

dust and fume collector. It consists of a cylindrical drum with a series of cones and baffles. During operation, water, supplied by a direct driven pump, cascades downward within the collector. This action produces a series of water curtains through which the dust-laden air is filtered in its upward travel. A double row of moisture eliminators is mounted above the washing chamber. Access doors are provided in the housing for inspection of the eliminators and wash chamber.

The dust and fume laden air are in continuous fluid contact during the upward flow. The baffle design sets up a cyclonic washing action and turbulence, which separates the wet dust and carries it to the sludge tank below. Saturated air continues up through a two-stage moisture eliminator and emerges dry.

The design of the Van-Truer dust and fume collector incorporates a flat bottom which serves as a settling tank from which the water is recirculated. A chute type of clean-out is provided for easy hand clean-out. Models equipped with a flight conveyor for the purpose of ejecting sludge into a container are also available. Van-Truer dust collectors are engineered for truss-suspension, floor-setting, or erection on roofs.

Details can be obtained by writing Van-Truer Company, Inc., 12600 Beech Rd., Detroit 23, Mich., or by circling No. 16 on Reader Service Card inside back cover.

Van-Truer Dust and Fume Collector. Inset shows cut-a-way view of this equipment in operation.

★ ★ ★

Oxyphen pH Papers

True Brite Chemical Products Co., Oakville, Conn., has announced True Brite Oxyphen pH Papers for testing the pH of electroplating solutions without the use of separate color charts or comparison charts.

According to the manufacturer, these papers provide instantaneous reading of the pH, by comparison of the indicator bar with the nearest constant color bar. Thirty separate ranges cover all of the practical conditions from acid copper solutions (0.3 to 1.8) to cyanide copper solutions (11.5 to 14.0). pH papers are packaged in a pocket-sized box which holds 200 papers and as many as six different ranges.

For further information write True Brite Chemical Products Co., Box 31, Oakville, Conn., or circle No. 17 on Reader Service Card inside back cover.

★ ★ ★

Cyanide Tester

A special alloy pencil for testing and determining the approximate "free"

ACME Automatics

FOR HIGH PRODUCTION at LOW COST on

POLISHING and BUFFING • DE-BURRING
WIRE BRUSHING and MICRO-FINISHING

● **Proved performance and dependability in industry for half a century**

RECOMMENDATIONS and QUOTATIONS

● *We will be pleased to receive blue prints or preferably finished and unfinished samples of the part you contemplate finishing together with detailed information on present finishing operation and production requirements. On receipt of samples and data we will offer recommendations and quotations.*

CATALOGS ON REQUEST

ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINERY FOR NEARLY HALF A CENTURY

Cyanide Test Pencil

cyanide concentration of copper solutions has been announced by Pollack Products Co., Brooklyn, N. Y.

Called the "Free" Cyanide Test Pencil, it is used by dipping the tip into the solution being tested for about 15 seconds. The user can tell whether the concentration of "free" cyanide is in the proper range by observing the pencil. Regular use of the pencil at the tanks will indicate whether additions of copper salts or cyanides should be made. Further information may be obtained from Pollack Products Co., 1628 E. 7th St., Brooklyn 30, N. Y., or by circling No. 18 on Reader Service Card inside back cover.

★ ★ ★

Cartridge Type Water Demineralizer

Enley Products, Inc., has announced a permanent cartridge-type water demineralizer. Known as the "Perma-

SELENIUM RECTIFIERS

. . . built to your Specifications.

INDUSTRIAL AND LABORATORY USE.

- ELECTROPLATING
- ANODIZING
- PERIODIC REVERSERS
- CONTROLS

CATALOG AVAILABLE ON REQUEST.

RAPID ELECTRIC CO.
2877 MIDDLETOWN ROAD, N. Y. 61, N. Y.

KEEP SPRAY BOOTHS SAFER FROM FIRES!

with the original non-inflammable

BATES BOOTHCOATING #4 (for dry booths)
BATES BOOTHCOATING #5 (water type)
BATES FLOORCOATING (for floors)
at 1940 prices

- Makes frequent cleaning easy
- Paint peels off in sheets
- Saves time and labor in applying
- Advocated by Insurance Companies

New Low Prices

15 gallon drums 90¢ gallon
55 gallon drums 80¢ gallon*
F.O.B. Buffalo, N. Y.
*55 gallon drums only prepaid $1.00 gal.

BATES WATER WASH COMPOUND
275# drums 12¢ lb. Buffalo

Our Money-Back Guarantee Is Your Assurance Of Top Quality and Satisfaction

Distributors Franchise Open

BATES SOAP CORP.
1231 Seneca St. • Buffalo 10, N. Y.

BLACK MAGIC

meets every BLACK OXIDE FINISHING *Specification!*

BLACK MAGIC — whether applied to civilian or defense production — has proved to be a versatile, economical finish. Its ability to blacken heat treated parts or previously "hard to blacken" items has established **BLACK MAGIC** as a finish capable of exceeding black oxide requirements.

Other advantages are:

★ One Bath - One Salt
★ Lower Operating Temperature
★ Self Rectifying
★ Faster Blackening Cycle
★ More Corrosion Resistant

MEETS GOVERNMENT SPECIFICATIONS

A comprehensive study of the application of black oxide finish has been compiled and is now available in our latest catalog. The study also covers Black Magic Blackening Processes for other ferrous and non-ferrous metals; metal cleaners, rustproofing oils and waxes, plating specialties and a complete line of heat treating salts.
Write for your complimentary copy today.

Mitchell-Bradford

THE MITCHELL-BRADFORD CHEMICAL CO.
2441 Main St. Stratford, Conn.

QUALITY PRODUCTS OF CHEMICAL RESEARCH

Perma-Demon Cartridge-Type Water Demineralizer

Demon," it is designed for removal of ionizable impurities from tap water, and is well suited for use by laboratories and electroplaters.

Requiring no cartridge replacement by the manufacturer, the Perma-Demon is furnished as a clear, unbreakable plastic tube with a removable top cover, and with a built-in porous stone filter and a Fiberglas screen. It is attached to the wall near a tap with aluminum brackets, and connected to the water source and destination.

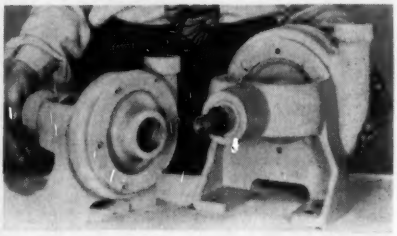
The ion-exchange material can be easily removed and replaced.

For further data circle No. 19 on Reader Service Card inside back cover.

★ ★ ★

Centrifugal Pump

Carl Buck and Associates has announced a line of Camac cast steel centrifugal pumps. Cast steel is superior to cast iron for handling alkaline solutions such as cyanide and caustic and acids such as chromic, it is stated.



Camac Cast Steel Centrifugal Pumps

Heads of from 10 to 150 feet can be provided with flows from 10 to 200 g.p.m. Seals are either Camac Special or Teflon, and may be water-cooled.

Further information is available from Carl Buck & Associates, Essex Fells, N. J., or by circling No. 20 on Reader Service Card inside back cover.

★ ★ ★

Phosphate Coating

A rust inhibiting phosphate coating which improves the appearance and durability of painted finishes on metal surfaces has been announced by the Man-Gill Chemical Co., 2338 Canal Rd., Cleveland, Ohio.

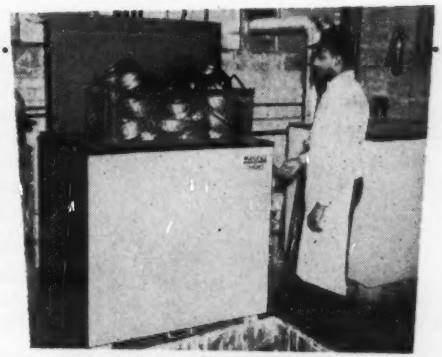
The formulation, known as MG-601,

MORSE
VERTICAL DRUM TRUCK
ROCK-A-DRUM

Picks up 55 gal. drums, rolls them over for side draining. Becomes a rugged stand on 3" wheels.
MORSE MFG. CO., INC. 762 W. Manlius St. East Syracuse, N.Y.

McKeon's "Liquid Sulphur"
Economical, satisfactory for
STRIPPING COPPER
and
OXIDIZING COPPER AND SILVER
Literature on request
Sulphur Products Co., Inc.
228 McKEON WAY GREENSBURG 6, PA.

PRECLEANING Cuts Waste... Improves Results!



Magnus Aja-Lif Cleaning Machine for precleaning with any suitable Magnus Precleaning Material.

Stop wasting the cleaners you use to get a chemically clean surface for electroplating. Precleaning takes off most of the dirt to a physically clean surface, avoiding contamination in final alkaline or electro-cleaning operations.

Stop wasting manpower in hand cleaning operations on hard-to-remove buffing compounds, cutting oils and similar dirts.

Stop wasting effort in trying to remove solid dirt particles which do not come off wth vapor-degreasing methods.

Let Us Show You What Economical PRECLEANING Is

There are a number of Magnus Cleaners ideally adapted to precleaning operations, each rendered more effective and economical when used in Magnus Agitating Cleaning Machines of suitable capacity and design to meet your production requirements. On the majority of precleaning operations, Magnus Precleaner (dip or spray), followed by a thorough water rinse, will give you parts ready for all finishing operations except electroplating . . . and in far better condition for final cleaning for plating.

ASK FOR A DEMONSTRATION
. . . in your plant or in the Magnus Pilot Plant Laboratory

magnus

MAGNUS CHEMICAL CO., INC.
208 South Ave., Garwood, N. J.

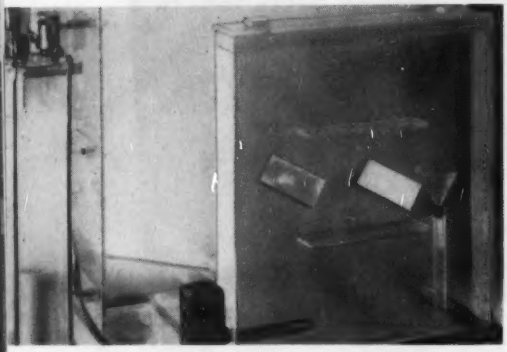
We would like to have a demonstration of Magnus Precleaning Methods.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____



MG-601 Phosphate Coating being tested in H-T Sincolite salt spray cabinet. Sample on left is untreated, sample on right received treatment.

produces a rust inhibiting phosphate coating in excess of 150 miligrams per square foot, the manufacturer claims. Salt spray tests of metal treated with the material show increased life of painted finishes. As a paint base, the fine grained crystalline structure of this coating improves adhesion of the paint.

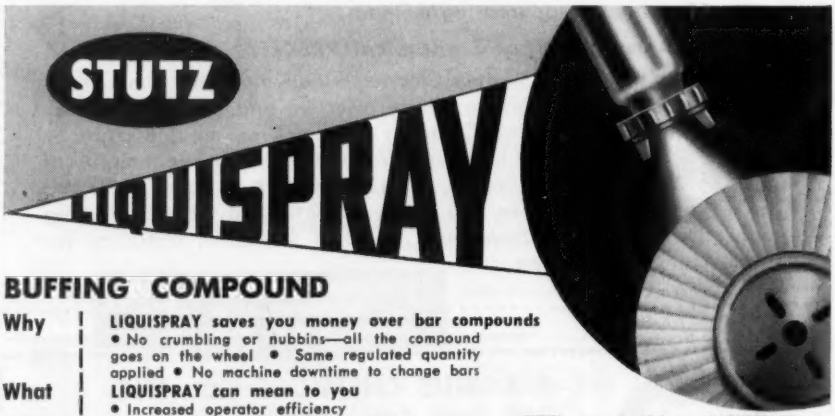
The manufacturer states that the coating, easily applied by immersion, meets all government specifications.

For further data circle No. 21 on Reader Service Card inside back cover.

★ ★ ★

Die-Cut Pressure Sensitive Tape

Die-cut pressure-sensitive tapes have been developed to precisely mask out unusual shapes or to protect holes and apertures during manufacturing operations. Precision cut to the specifications of each masking job, these masks assure sharp-line masking during painting, plating, buffing, polishing, stencil-



BUFFING COMPOUND

Why — LIQUISPRAY saves you money over bar compounds
• No crumbling or nubbins—all the compound goes on the wheel • Same regulated quantity applied • No machine downtime to change bars

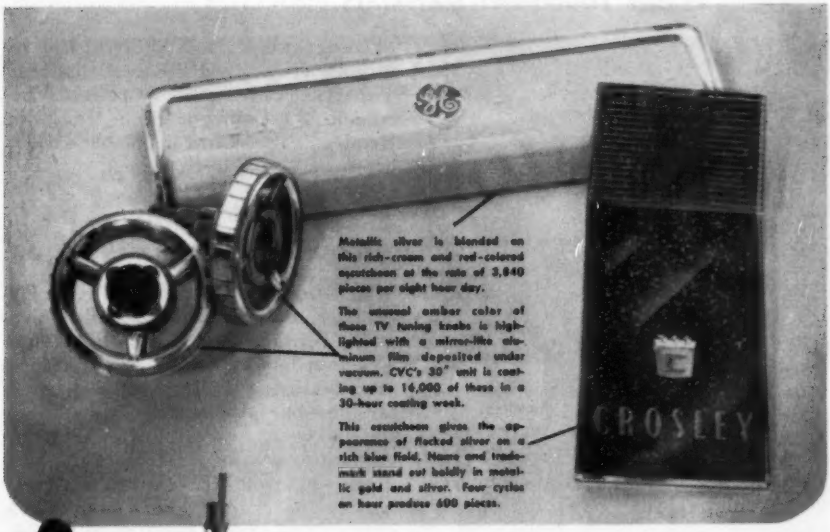
What — LIQUISPRAY can mean to you
• Increased operator efficiency
• More uniform finish and fewer rejects
• Compound costs cut up to 50%
• Tremendous increase in buff life

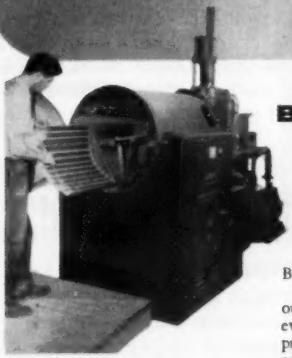
Choice of heavy cut, cut and color, or color in either tripoli or stainless steel grades.

WHY you should use LIQUISPRAY
• Abrasives will not settle
• No fire hazard
• No clogging of idle guns
• All the compound sticks to the wheel
• Leaves work free of dirt and easy to clean prior to plating

LIQUISPRAY is the best... We invite your inquiry specifying your particular requirements. Samples available.

GEO. A. STUTZ MANUFACTURING COMPANY
4410 Carroll Avenue, Chicago 24, Ill.


Metallic silver is blended on this rich-cream and red-colored escutcheon at the rate of 3,840 pieces per eight hour day.
The unusual amber color of these TV tuning knobs is highlighted with a mirror-like aluminum film deposited under vacuum. CVC's 30" unit is coating up to 14,000 of these in a 30-hour coating week.
This escutcheon gives the appearance of flocked silver on a rich blue field. Name and trademark stand out boldly in metallic gold and silver. Four cycles an hour produce 600 pieces.
CROSLEY



This CVC type LC1-30 high-vacuum coater is metallizing escutcheons and other parts at Buffalo Molded Plastics Inc. Photo shows operator inserting loaded racks into the coater. Like all CVC coaters, this unit was delivered with all necessary equipment ready for immediate installation.

Brilliant Escutcheons by the thousand

CVC vacuum metallizing fills heavy production quotas fast

"WE are already operating at four cycles an hour with our new *CVC* coater," writes Charles E. Catalde, President, Buffalo Molded Plastics Inc.

"This is more than adequate for our present production quotas. However, when we're ready for increased production, I'm sure we can add another complete cycle without any trouble."

The *CVC* vacuum coater Mr. Catalde speaks of gives a chamberful of parts a brilliant metallic luster in a matter of minutes.

And it doesn't require a skilled operator—a few hours experience in the use of the machine trains any of your help to turn out flawless pieces in large quantities.

The operator simply inserts racks of lacquered parts into the vacuum chamber, valves in the roughing pump for initial evacuation, and then opens the high-vacuum valve to the diffusion pump. In a matter of seven or eight minutes the chamber pressure reaches the desired level and the operator flashes the filament which evaporates the aluminum. Immediately the aluminum begins to condense on the parts. It's easy. It's inexpensive.

We'll be glad to share our experience in vacuum metallizing and associated lacquer operations to help you set up your own system.

For further information, write to ***Consolidated Vacuum Corporation, Rochester 3, N. Y.*** (a subsidiary of Consolidated Engineering Corporation, Pasadena, California).

CVC

Consolidated Vacuum Corporation

ROCHESTER 3, N.Y.

Headquarters for High Vacuum

sales offices: NEW YORK, N. Y. • CHICAGO, ILL. • BOSTON, MASS. • SAN FRANCISCO, CALIF. • CAMDEN, N. J.

Pressure-sensitive tape being used to mask apertures in a casting, prior to finishing.

ing, and sand blasting. Die-cut masks are supplied in rolls and are mounted on a "quick release" paper backing for fast application.

Sizes from 20 by 40 inches down can be supplied in irregular shapes or sizes to meet specifications. For further information, write Printed Cellophane Tape Co., 521 N. La Brea Ave., Los Angeles 36, Calif., or circle No. 22 on Reader Service Card inside back cover.

★ ★ ★

Graphite Heat Exchanger

The Impervite Cross-Bore Heat Exchanger, manufactured by Falls Industries, Inc., utilizes a simplified construction having a solid bar of Impervite measuring the total bundle diameter. This bar is accurately drilled longitudinally and laterally. The design incorporates greater strength in the bundle, and permits the use of chemically impervious graphite heat exchangers, even where mechanical shock is encountered, such as steam hammer.

This heat exchanger allows operation

NICKELITE

BARREL NICKEL BRIGHTENER

cuts brightening costs — concentrated to quadruple strength—shipping weight is cut 275%. You don't ship, store or handle water! No deposits, no carboy returns. A capful is enough for a barrel of nickel.

Nickelite boosts corrosion resistance of barrel nickel 30 to 100% by actual salt spray test.

Platers Research Corporation

59 EAST 4TH ST.
NEW YORK 3, N. Y.

FUNCTIONAL FINISHES!!

If you require your coatings to accomplish some specific task — something beyond mere ornamental appearance or average longevity —

Try Us!

We make ACRYLIC, ALKYD, CELLULOSIC and VINYLOID coatings for a very wide range of specialized industrial applications.

The Varnish Products Co.

5204 Harvard Avenue
Cleveland, Ohio

SEYMOUR

means

SERVICE

with a big...

Seymour service extends beyond the making of Anodes and Bright Nickel. It goes right to the heart of your individual plating problems with the services available to you—without cost—in the Seymour Laboratory.

Here, a well-equipped staff of skilled technicians is ready to lend a hand whenever you need help.

SEYMOUR PLATING PRODUCTS

NICKEL ANODES in all standard shapes and formulas.

"SEYCAST" Nickel Anodes of 99% cast nickel.

ANODES of Copper, Brass, Bronze, Zinc in all types.

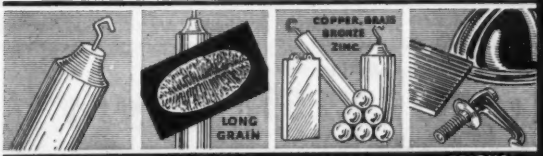
BRIGHT NICKEL produces bright deposits without coloring and buffing.

SEYMOUR ALSO MAKES . . .

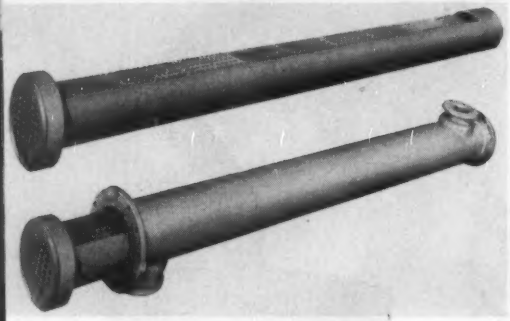
Nickel Silver — Phosphor Bronze — Brass — Welding Rods.

THE SEYMOUR MANUFACTURING COMPANY

SEYMOUR, CONNECTICUT, U. S. A.



NICKEL ANODES | "SEYCAST" ANODES | OTHER ANODES | BRIGHT NICKEL



Impervite Cross-Bore Heat Exchanger (top), inserted into shell (bottom).

in the 150-200 p.s.i. range. It is especially recommended for applications where excessive fouling is a problem, as all passages are accessible by sliding the bundle out of the shell.

Made of resin-impregnated graphite, which is extruded and machined, this equipment is immune to most corrosives and has a high rate of thermal conductivity. Resistant to thermal shock, this exchanger can be used for heating and cooling. It can be used for temperatures up to 340 deg. F. as furnished, or with specially treated graphite, for temperatures to 570 deg. F.

Additional information may be obtained from John Reys, chief engineer, Falls Industries, Inc., 31767 Aurora Rd., Solon, Ohio, or by circling No. 23 on Reader Service Card inside back cover.

★ ★ ★

Anhydrous Alkaline Cleaner

An anhydrous alkaline cleaner has been announced by the Metasurf Corp., 12830 Eaton Ave., Detroit 27, Mich. Called Metaclean No. 85, it is recommended as a soak cleaner prior to galvanizing, electroplating, or porcelain enameling. Since it is anhydrous, the material may be used at low concentrations, the manufacturer states. For normal soils, 4 to 6 ounces per gallon of water is sufficient. The product is non toxic, and evolves no obnoxious odors.

For further data circle No. 24 on Reader Service Card inside back cover.

★ ★ ★

Vacuum Metallizer

A compact vacuum metallizer, designed for firms with moderate production requirements, such as jewelry manufacturers, custom metal finishing plants, and other manufacturers who wish to do their own finishing but have a relatively small volume of work, has been introduced by the F. J. Stokes

SOLVENTS and THINNERS RECOVERED

from wash thinners, spoiled lacquers, degreasing machine sludge, etc.
Solvents recovered by the Lofgren Process.
Each customer's shipment, whether one drum or a carload, receives proper and separate treatment. *Write to:*

Solvents Recovery Service, Inc.
1025 Broad St. Newark 2, New Jersey
Hammond Solvents Recovery Service
241 Brunswick Rd. Hammond, Ind.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

VERSATILITY

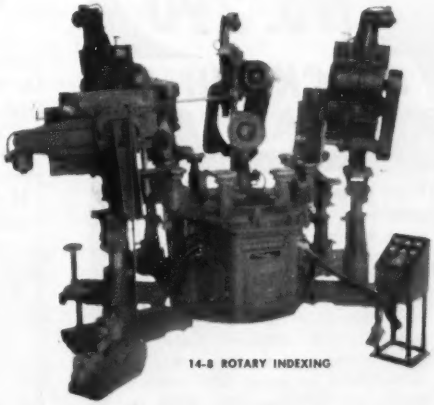
Packer-Matic's ability to handle multiple contour units in short runs is just one of the many sound reasons why cost conscious production men are selecting Packer Automatic Machines to solve their finishing problems.

The Unicycle pictured above depicts versatility in its own right. The Packer-Matic shown below is a perfect example of a modern piece of machinery designed to do many jobs; polishing, buffing or deburring, faster, more economically and with greater uniformity than hand operation.

Packer-Matics are leaders because they are designed specifically to perform a multiplicity of jobs with an efficiency that will increase customer satisfaction and profit.

Send your specifications today to ENGINEERING, for quotation.

THE PACKER MACHINE CO.
MERIDEN, CONNECTICUT



14-8 ROTARY INDEXING

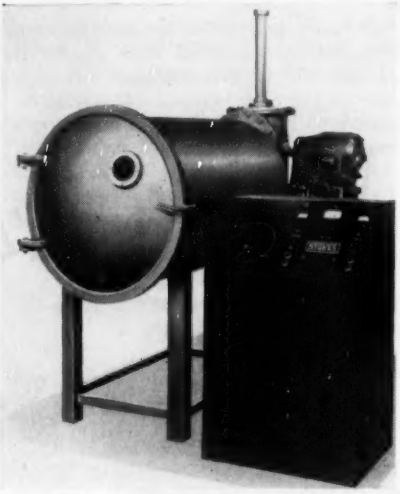
PACKER-MATIC
AUTOMATIC MACHINES FOR BUFFING • POLISHING • DEBURRING

Machine Co., Philadelphia, Pa.

The Model 428 metallizer has a chamber 36 inches in diameter and 60 inches long. It is a simplified unit, stripped of some of the more elaborate automatic features of the larger Stokes metallizers, and is intended to bring vacuum metallizing within the reach of firms whose present volume would not justify the larger units.

The vacuum-coating unit has an integral vacuum pumping system, consisting of an oil diffusion pump and a mechanical force-pump, which will bring the chamber down to the metallizing pressure of 0.5 micron in about 10 minutes.

The work-holding rack of the Model 428 will accommodate four standard rotating fixtures. These racks can be retained and used in larger Stokes units. For further information, write F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa., or circle No. 25 on Reader Service Card inside back cover.



Stokes Model 428 Vacuum Metallizer

★ ★ ★

Hot Spray Vinyl Paint

A hot-spray-applied vinyl-based protective coating has been announced by The U. S. Stoneware Co., Akron, Ohio.

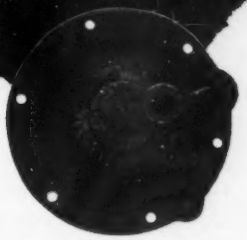
The coating, Tygon ATD, combines

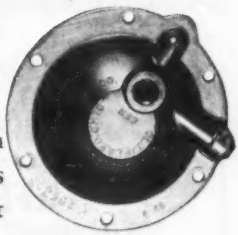
Park No. 290
BLACKENING SALT

Black Oxide finishing for rust resistance and decorative parts. Speedy black coating in water solution with no electric current. Permanent black finish on ordnance parts, tools, aircraft, bearing races. Dazzling black decorative finish for television cameras, business machines, hardware, metal screens and machine parts. Excellent bond for paints and enamels. Simple one bath operation. Write for bulletin H-16. Park Chemical Co., 8078 Military Ave., Detroit 4, Mich.

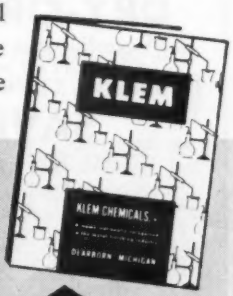
NOW...
YOU CAN ADD AUTOMATIC REGULATION TO YOUR PRESENT RECTIFIER WITH
Gn PLUG-IN CONTROLLER
• NO REBUILDING
• NO REWIRING
• JUST PLUG-IN AND OPERATE
• ANY AMPERAGE, ANY VOTAGE
GENERAL NUCLEAR CORP.
550 FIFTH AVE. N. Y. 37, N. Y.
PLATING RECTIFIERS AND CONTROLS
SALES AGENT INQUIRIES INVITED

You can't tell the difference by FEELING the drum!





It's the quality of the job you get and the savings in material, time, heat, etc., that make KLEM chemicals preferred. That's why one of the largest and most modern plating operations in the automotive industry recently chose Klem chemicals in preference to all others. The Klem man in your area may have the answer to your tough problem — if he doesn't the Klem lab does. Send us a sample for trial.



WRITE FOR THIS CATALOG

KLEM
CHEMICALS, Inc.
14401 LANSON AVE., DEARBORN, MICHIGAN

Tygon ATD Vinyl Paint being applied by the hot spray method.

vinyl and other plastic resins to form a high solids content viscous material that reverts to a liquid form on the application of heat, thus avoiding the use of excessive amounts of solvents to achieve spraying consistency, it is claimed.

Tygon ATD is brought to a temperature of approximately 160 deg. F. in a standard paint heater. An air pressure of 20 pounds forces the heated paint to the spray gun where it is atomized by 50 pounds of air. As the hot paint leaves the spray gun, most of the incorporated solvents are evaporated and a thick, high solids content film is deposited. Since but little solvent remains in the film, drying is quick.

The dry film is dense and impermeable. Tygon ADT Hot Spray Paint is resistant to the attack of most commercially used acids and alkalies, as well as to alcohols, water and oils. It is, however, attacked by aromatic hydrocarbons, ketones and esters.

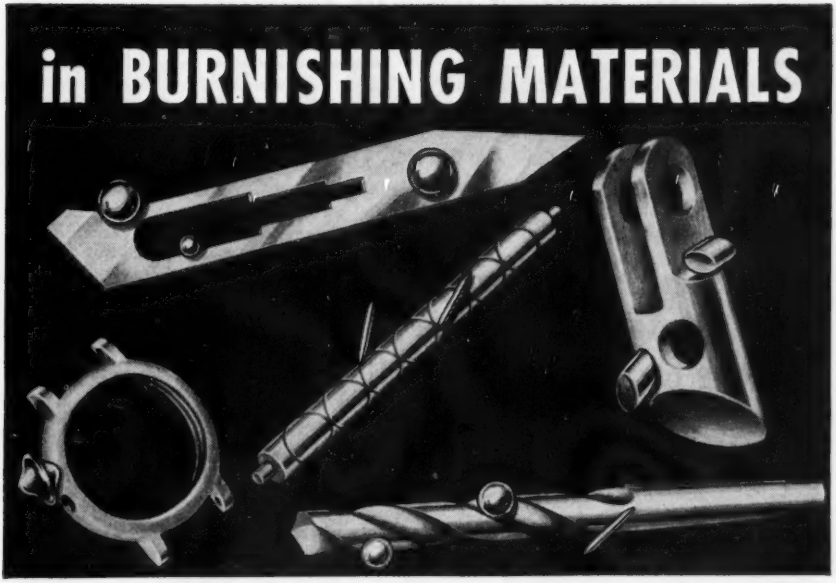
Full details may be obtained by

Protect spray booths with
BOOTHCOTE
the finest product made!
SAFER
NON-INFLAMMABLE, NON-TOXIC.
DRY-OR-WET
Boothcote No. 4 for dry wall booths
(just peel off overspray)
Boothcote No. 5 for water wash walls
SAVES
TIME, LABOR, MONEY!
In 55 gal. drums..... 80¢ gal.
In 15 gal. drums.....$1.00 gal.
In 5 gal. pails.....$1.25 gal.
F.O.B. Buffalo, N. Y.
Inquiries Invited—Samples On Request
HYGRADE Food Products Corp.
Industrial Division
18 Stetson St., Buffalo 6, N. Y.

Engineered for Extra Years of Trouble-Free Operation
WALKER
Selenium Rectifiers
You can't beat Walker Selenium Rectifiers for dependable D.C. regardless of the size of your plating installation.
These outstanding rectifiers are especially designed to give year in, year out service . . . minimum maintenance . . . no moving parts . . . nothing to wear out . . . nothing to get out of adjustment.
You get more for your money when you use Walker Selenium Rectifiers. Get the complete story, today. Write

THE WALKER DIVISION
NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT

in BURNISHING MATERIALS



it's the SHAPE that counts!

For fast, efficient barrel burnishing of small parts, stampings and castings, use Abbott Burnishing Materials. They're *shaped* to do the job right!

Abbott Burnishing shapes—Ball, Ovalball, Cone, Diagonal, Pin—are scientifically designed to make effective contact on parts of any size and shape. Each is made from high quality, Abbott bearing ball steel, deep hardened and polished to a mirrorlike glass hard finish. For the most satisfactory burnishing results . . . use ABBOTT.

Useful information on barrel finishing is given in the Abbott Catalog-Manual. Write for your copy.

ABBOTT
the all round ball

THE ABBOTT BALL COMPANY
1064 New Britain Ave.
Hartford 10, Conn., U.S.A.

writing G. W. Fine, The U. S. Stoneware Co., Akron 9, Ohio, or by circling No. 26 on Reader Service Card inside back cover.

★ ★ ★

A trend to porcelain enamel in church construction has been cited by Seaporcel Metals, Inc., maker of porcelain enameled materials.

Among churches for which Seaporcel has undertaken jobs recently is the First Lutheran Church of Albany, N. Y., which will have a white gable and steeple of porcelain enamel. It will utilize Seaporclad, which has a porcelain face, one-inch Celotex core and galvanized back.

In Los Angeles, the Church of Jesus Christ of Latter-day Saints, greatest temple ever built by the Mormons, will have a high tower clad with Seaporcel porcelain. The porcelain color is to be simulated artificial stone to match the rest of the structure.

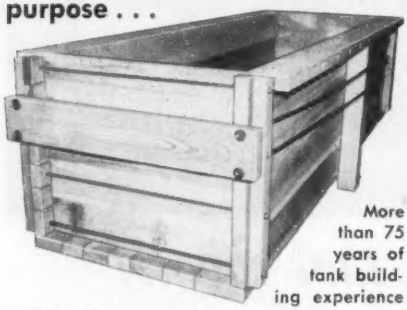
Other Seaporcel jobs include a porcelain enamel steeple for the First Christian Church of Birmingham and grey Seaporclad for three sides of Salem Lutheran Church at Bridgeport, Connecticut.

★ ★ ★

"Man has existed for about a million years. He has possessed writing for about six thousand years, agriculture somewhat longer. Science, as a dominant factor in determining the beliefs of educated men, has existed for about three hundred years; as a source of economic techniques, for about one hundred and fifty years. When we consider how recently it has risen to power, we find ourselves forced to believe that we are at the very beginning of its work in transforming human life."

—*Bertrand Russell*

WOOD TANKS
for every plating and pickling purpose . . .



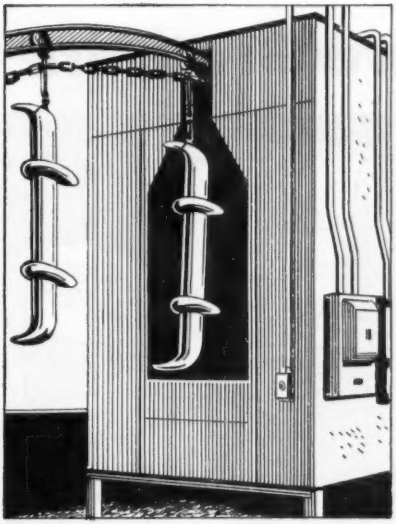
More than 75 years of tank building experience

Kalamazoo
CUSTOM BUILDS TO FIT YOUR NEEDS
Bring your problems to Kalamazoo—get tanks you can depend on for years and years.
Kalamazoo TANK and SILO CO.
433 HARRISON ST. • KALAMAZOO, MICH.

METABOND
MEANS *PROGRESS* IN RUSTPROOFING
METABOND is the only effective immersion or spray amorphous type zinc coating in the industry today.
METABOND withstands severe and consistent flexing and bending without chipping or breaking bond.
INTERNATIONAL RUSTPROOF CORPORATION
12507 PLOVER AVENUE • • • • CLEVELAND 7, OHIO
MANUFACTURERS OF RUST PREVENTIVES AND CORROSIVE SOLVENTS

Start of a beautiful finish!

The start of a beautiful metal finish is a good washing compound. It must effectively clean all metals and, at the same time, assure less down-time and reduce production costs!



DIVERSEY 519

Solves Three Big Problems

1 *Excessive maintenance down-time caused by hard water scale in nozzles and on heating coils.*

519's superior water-softening action *prevents* scale from forming.

2 *Production rate limited by speed of cleaning operation.*

Quicker wetting and penetrating action of 519 speeds up washing operation.

3 *Compound requirements too high.*

519 provides excellent emulsification at far *lower* concentrations—and it lasts longer.

Write today for information on how Diversey 519 can solve all of these problems for you, and give you a superior metal finish. No obligation, of course.

THE DIVERSEY CORPORATION

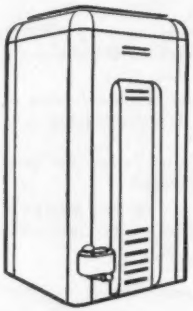
1820 Roscoe Street, Chicago 13, Illinois

(In Canada: The Diversey Corporation (Canada) Ltd., Port Credit, Ont.)

Speed your production as this

with new DUOTONE

by Lowe Brothers



A large manufacturer of theater seats wanted to step-up production of seat backs by eliminating back-tracking and double-handling in the finishing process. Lowe Brothers "Finishing Specialists" developed an amazingly fast spraying, solid covering (one coat!), quick setting enamel for his product. Besides greatly speeding the flow of finished parts, this sensational new finish—*Duotone Enamel*—provided the best looking, longest wearing, most economical finish this manufacturer had ever used!

New *Duotone* Enamel is the ideal finish for a broad range of sheet metal products. It gives maximum beauty and wearability, yet keeps finishing costs at a minimum! ⇨ ⇨ ⇨

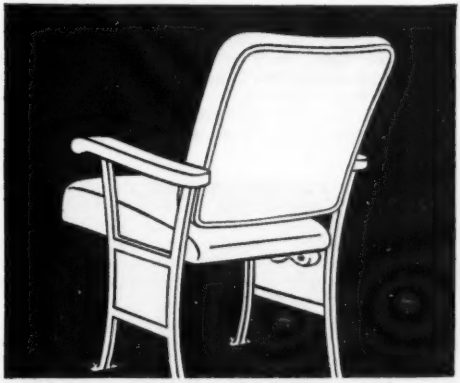
This advertisement is based on facts from Lowe Brothers Case History files.

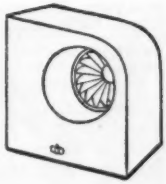
ENGINEERED QUALITY

manufacturer did...

ENAMEL

Extremely fast baking! Amazingly tough!





Check these important Duotone Enamel features • Dries in 15 minutes at 300° in a conventional oven—and in 8 minutes under infra-red! No orange peel! • Available in any degree of gloss—wide color choice. • It's a modified alkyd resin type enamel. • Sets a new standard for wearability! Practically impossible to mar or scratch! • Resists perspiration and skin oils. • *Duotone* keeps material cost to a minimum! Just one coat (only ½ mil thick) covers bare metal surfaces perfectly with an adequate protective film . . . *Duotone may save you plenty in 1955! You pay nothing to find out. Write today for the full story.*

The Lowe Brothers Company • Dayton 2, Ohio • Industrial Division

District Offices: Atlanta • Boston • Dallas
Chicago • Jersey City • Kansas City

LOWE Brothers

FINISHES FOR INDUSTRY SINCE 1870

NEWS of the Industry

COMPANIES

ATLAS POWDER COMPANY has announced that sales headquarters for Darco activated carbons have been transferred from New York City to Wilmington, Delaware.

DR. HOLMES J. FORNWALT became manager of Darco sales at the time of the transfer.

The new Darco headquarters will be located in the recently completed Atlas Building in Wilmington.

Dr. Fornwalt, a native of Myerstown, Pa., received his bachelor of science degree in chemical engineering and his master of science degree in chemistry at Lafayette College, Easton, Pa., after which he attended Harvard University, where he received both master's and doctor's degrees in chemistry.

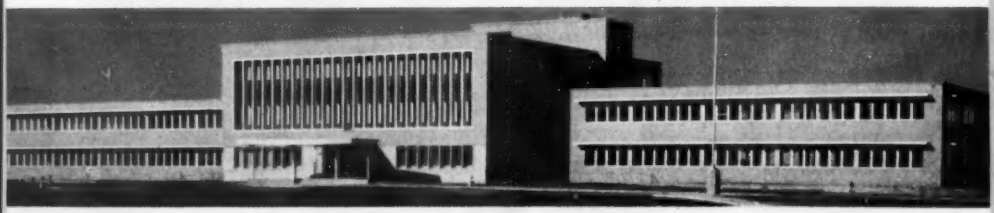
He joined Atlas in 1936 as a research chemist at the Darco Experimental Laboratory, Marshall, Tex., and became assistant director of the laboratory in 1945. He has been in New York as sales representative for Darco carbons since 1946.

★ ★ ★

The **PENNSYLVANIA SALT MANUFACTURING CO.** has announced the opening of a new plant at Delaware, Ohio. This plant is a component of the Chemical Specialties Division. A similar installation is nearing completion at Chicago Heights, Ill.

These plants will serve as blending, packaging and warehousing centers for Pennsalt in the east-central area. They are the first of a number of projected units designed exclusively for this purpose.

Included among the products produced in the new Pennsalt plants are metal processing chemicals including the Fosbond and Foscoat lines, corrosion resistant cements and coatings, and maintenance chemicals.



New General Offices of Atlas Powder Company, Wilmington, Delaware

THE AMERICAN BRASS COMPANY will soon begin construction of a new brass mill in the Paramount district of Los Angeles, California, according to a statement issued by John A. Coe, Jr., company president.

The new mill, according to the statement, will be built for the production of copper and copper-base alloys in the form of sheet, strip, rod, tubing and drawn copper products. Annual capacity is estimated to be about 30,000,000 pounds.

The building will be one-story construction and will be equipped with overhead crane service throughout. The mill and office will require 330,000 square feet of floor space.

★ ★ ★

At the fifty-seventh annual sales conference of **J. B. FORD DIVISION, WYANDOTTE CHEMICALS CORPORATION,** district sales managers laid plans for expanded sales and service activity in 1955. A broader product line and a larger service staff are planned.

The conference was held at the St. Clair Inn in Michigan and was followed by regional meetings in Philadelphia, St. Louis and San Francisco. These regional meetings were attended by Wyandotte's entire North American sales force.

★ ★ ★

ALMCO SUPERSHEEN DIVISION OF QUEEN STOVE WORKS, INC., Albert Lea, Minnesota, has announced Almco Supersheen Awards, for the purpose of rewarding meritorious achievements in barrel finishing progress.

Three separate Almco Supersheen Awards will be given in 1955 in each of two divisions. The first division award will be for contestants presenting case history evidence of the "Largest Total Dollar Saving" from finishing a part or parts by Almco Supersheen as compared to former finishing methods. The second division award will be made to contestants presenting parts finishing histories that show the "Greatest Percentage of Saving" from finishing a part by

(Left to right) Andrew Liger, head of Wyandotte's Industrial Research Laboratories; James L. Ramsey, manager of Railroad Sales; F. H. Tholen, sales manager; Ford Ballantyne, Sr., vice president, secretary and treasurer; Ford Ballantyne, Jr., vice president and general manager of the J. B. Ford Division; Robert B. Semple, president, Wyandotte Chemicals Corporation; P. N. Burkard, manager of Industrial, Railroad and Aircraft Department; Robert J. Racine, manager of Industrial Sales; and C. E. Smith, administrative assistant to Mr. Ballantyne, Jr.

Donald E. Anderson, director of Technical Service, is at extreme right, second row. Other men shown are the 17 district sales managers of the J. B. Ford Division and Wyandotte Technical Service and Research men.

Supersheen Speed Finishing as compared to finishing by a former method or methods. In each division there will be a grand prize plus the first and second place awards and six honorable mention citations.

Anyone or any company is eligible to compete for the Almco awards who is using Almco finishing equipment.

For entry blanks and further information, write to R. C. Trow, Almco Supersheen Division of Queen Stove Works, Inc., Albert Lea, Minnesota.

★ ★ ★

THE CARBORUNDUM COMPANY, Niagara Falls, N. Y., has acquired the **CURTIS MACHINE CORPORATION,** according to a joint announcement by General Clinton F. Robinson, president of Carborundum and Gene DeMambro, president of Lincoln Park Industries, Inc. of which Curtis Machine was a wholly owned subsidiary.

Mr. DeMambro, president and general manager of Curtis Machine since 1946, will continue in that capacity, reporting to Wm. H. Wendel, vice president in charge of Carborundum's Coated Abrasives Division in Wheatfield, New York. Mr. Wendel will coordinate the activities of Curtis Machine in The Carborundum Company.

Carborundum has built a giant mobile Abrasive Workshop and equipped it with modern abrasive belt machines. This traveling unit goes to customers' plants and demonstrates the latest abrasive belts and belt machines. In 4 months it has traveled over 27,000 miles and had over 7,500 guests aboard.

★ ★ ★

L. F. BODY, president of **BODY BROS., INC.,** Bedford, Ohio, has disclosed interesting facts about this five year old company.

L. F. Body

Mr. Body and his brother, Robert, who is vice president, started the growing company in 1950. Both have had previous experience in the industry, one in sales and management, and the other in sales, production and paint technology.

Under the direction and guidance of the Body brothers, a complete line of industrial finishes has been developed which includes aluminum paints, primers, baking finishes, air drying finishes, specialty and hammer finishes.

"Looking ahead," Mr. Body commented, "we can expect to add a full line of industrial maintenance materials and production lacquer finishes."

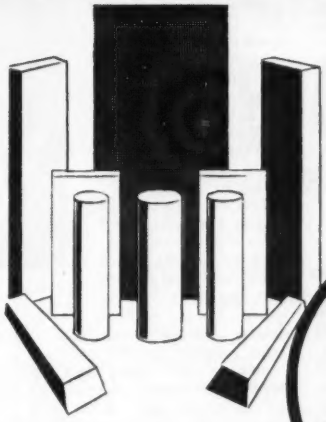
NEW POSITIONS

Victor M. Schwartz, executive vice president of the L. H. Butcher Co., a subsidiary of The Udylite Corporation, has announced the appointment of **DEAN WILLIAMS,** formerly of the metal finishing sales staff in Los Angeles, as manager of the Portland branch. Mr. Williams was chief chemist and metallurgist at Northrop Aviation and a process engineer at North American prior to joining the L. H. Butcher Co. in 1945. He has held a number of offices in the American Electroplaters' Society.

Jack Raskin, West Coast manager of the L. H. Butcher Co. metal finishing department, has announced the following changes in the sales and service staff: **WARREN BLAZER** and **PAUL KERANS** have been appointed sales engineers; **CLOYD COOK,** outside sales engineer; and **CHARLES THOMAS,** service engineer for Roto-Finish and Pressure-Blast equipment and processes.

Now! FOR THE FIRST TIME SCHAFFNER,

Brings you No Nubbing Compound!



FOR AUTOMATIC, SEMI-AUTOMATIC, HAND MACHINES

● At last something has been done to eliminate what has been a major problem in the polishing and buffing industry. Schaffner's brand new "No Nubbin" Stick Compounds can be used on your present equipment with absolute safety. No more flying nubbins.

By using Schaffner "No Nubbin" Stick Compounds, which have been production proven, you can realize a saving up to 75%.

Schaffner manufacturing company, inc.

Why not call or wire us collect for more information and samples.

SCHAFFNER CENTER

EMSWORTH • PITTSBURGH 2, PA.

David E. Neustadt

DAVID E. NEUSTADT has been named general sales manager of The W. W. Sly Manufacturing Co. of Cleveland, Ohio, according to announcement by C. R. Sare, company president.

The W. W. Sly Company manufactures dust and fume control equipment, as well as blast cleaning equipment, tumbling mills and industrial ovens.

Mr. Neustadt was formerly west coast district manager for the American Wheelabrator & Equipment Corporation. He came to Cleveland in 1952 as vice president and general sales manager of Chas. Rivitz & Co.

★ ★ ★

Fred W. Wagner, sales manager, Wagner Brothers, Inc., has appointed **THOMAS KOHLER** as sales and service representative for the Detroit, Michigan area.

Mr. Kohler was formerly manager of the Filter Division at Wagner Brothers, supervising all engineering and manufacturing for permanent membrane type liquid filters.

JAMES LEKANDER has been appointed sales and service representative for the southern Michigan industrial area, including Toledo, Ohio.

Mr. Lekander was formerly plating foreman and chemist with Industrial Stamping and Manufacturing Co. His background includes diversified experience in electroplating processes.

Wagner Brothers, Inc., manufactures a complete line of full automatic and semi-automatic plating machines, rectifiers, solution filtering systems, waste disposal installations, anodes, solutions and supplies.

James Lekander (left), Thomas Kohler

★ ★ ★

Robert V. Finch

Plans for the organization of a Department of Market Development have been announced by C. C. Bassett, vice president and director of sales for **COWLES CHEMICAL COMPANY**, Cleveland, Ohio.

ROBERT V. FINCH has been chosen manager of this department. His responsibilities will include sales correspondence promotion, advertising, sales research, market studies and related activities.

Mr. Finch has been with Cowles for nearly 18 years, serving at various times in most of the sales and technical departments. Most recently, he has served as manager of Cowles' Laundry Laboratory. He will continue as technical advisor to the laundry sales department and as editor of "Cowles Laundry Tips."

★ ★ ★

Election of **DR. JAMES T. EATON** to fill the newly created position of vice-president — production has been announced by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

Other recent changes in the operations set-up at E. F. Houghton & Co., are:

HERBERT M. MICHAEL, plant engineer, has been assigned full responsibility of the company's works engineering department, garage and printing dept., as well as maintenance of all office buildings, plants and equipment.

JOSEPH G. MacCRACKEN, development engineer, will supervise the newly created development engineering department, the hydraulic development department and the leather inspection department.

MEETINGS

The first **EMPIRE STATE REGIONAL MEETING** of the **AMERICAN ELECTROPLATERS' SOCIETY** will be held on Saturday, April 16 at the Hotel Seneca in Rochester, N. Y., with the Rochester Branch acting as host, it has been announced by Chairman Ed Wallin, Eastman Kodak Company. Frank Beuckman, chairman of the Educational Session, beginning at 2:00 P. M., has announced the following papers to be presented as the educational part of the program:

1. "Outdoor Durability of Decorative Finishes" by C. F. Nixon, Head Electrochem. Div., G.M. Research Corp., Detroit.
2. "Nickel Electroforming" by Dr. Dodd Carr, Bart Mfg., Inc., Belleville, N. J.
3. "Use of Vinyl Coatings in the Plating Industry" by D. R. Meserve, United Chromium, Inc., New York.

After the Educational Session and a special Ladies Program, there will be a Dinner Dance starting at 6:30 P.M. An entertainment program will follow the dinner. Tickets for the dinner dance, at $7.50 per person, may be obtained from Rochester Branch officers.

The Empire State Regional Meeting is sponsored by the **ROCHESTER, BUFFALO, SYRACUSE, CAPITOL DISTRICT** and **SOUTHERN TIER BRANCHES.**

Plans for the **ANNUAL SESSION** of the **INDIANAPOLIS BRANCH, AMERICAN ELECTROPLATERS' SOCIETY,** to be held April 23, 1955, have been announced. The program includes the following papers:

1. "Hard Chromium Plating," by Dr. George Dubpernell, United Chromium, Inc., Waterbury, Conn.
2. "Electroless Nickel" by Dr. Gregoire Gutzeit, General American Transportation Corp., E. Chicago, Indiana.
3. "pH and Plating," by Frank Scheufele, Beckman Instruments, Inc., S. Pasadena, Calif.

2 BIG EVENTS
under one roof
... featuring 1001 ideas for better finishing!

1 THE 1955 INDUSTRIAL FINISHING EXPOSITION

The first finishing show in three years . . . and it'll be jam-packed with exhibits. See all of the latest ideas for better finishing under one roof. Keep up-to-date in the fast-changing industrial finishing industry the easy way . . . by attending this big Exposition.

2 THE 42nd ANNUAL CONVENTION OF THE AMERICAN ELECTROPLATERS' SOCIETY

Don't miss this opportunity for a mutual exchange of ideas. This is your chance to see, hear and talk to all of the people who have contributed engineering advancements, research and know-how to industrial finishing.

ONE IDEA from the Exposition or Convention may save your company thousands of dollars!

Plan now to attend...

JUNE 20, 21, 22, 23, 1955

PUBLIC AUDITORIUM
CLEVELAND, OHIO

For Expedited Registration Cards or more information, write:
HAROLD E. BARTLETT
Exposition Manager

1955 INDUSTRIAL FINISHING EXPOSITION
c/o American Decorating Company
1849 W. 24th St., Cleveland 13, Ohio

SPRING MEETING, THE ELECTROCHEMICAL SOCIETY, INC., Hotel Sheraton-Gibson, Cincinnati, Ohio, May 1-5, 1955.

The educational session and banquet will be held at the Indianapolis Athletic Club.

★ ★ ★

The **ANNUAL MEETING** of the **MILWAUKEE BRANCH OF THE AMERICAN ELECTROPLATERS' SOCIETY** will be held April 30 at the Schroeder Hotel, Milwaukee, Wisconsin.

The meeting will open at 9:30 A. M., and will feature a discussion of water problems in plating and allied industries. William J. Neill of the Columbus Branch, (superintendent of Columbus Metal Products Co.) who has served on the Metal Finishing Industry Action Committee of ORSANCO, will be the honorary chairman. He, as the first speaker will discuss how this group is solving waste disposal problems. Theodore F. Wisniewski, director of the Committee on Water Pollution for the state of Wisconsin will discuss pollution problems in Wisconsin and adjacent areas which are currently under study. Dr. Tooper, of the National Aluminate Corporation of Chicago, will discuss "Ion Exchange Methods for Water Treatment and Waste Disposal."

Dr. Ralph A. Schaefer, president of the A.E.S., will discuss the affairs of the society briefly, and will deliver a paper on "A Qualitative Study of Macro and Micro Metal Distribution in Plating Baths."

★ ★ ★

Dr. H. B. Linford

Dr. R. O. McDuffie

M. J. Udy

The **ELECTROCHEMICAL SOCIETY** will hold the **107TH MEETING** at the Sheraton-Gibson Hotel, Cincinnati, Ohio, from May 1 to 5, 1955.

Sessions are scheduled on: Electric Insulation; Electronics, including Luminescence, Oxide Cathodes, Phosphor Application, and Semiconductors; Electrothermics and Metallurgy; Industrial Electrolytics; and Theoretical Electrochemistry. The program includes 184 papers for the four days of technical sessions.

The Electrothermics and Metallurgy Division will present two symposia.

The first symposium, all day Monday, May 2, is entitled "Materials Handling and Preparation for the Electric Arc Furnace." H. S. Newhall, chairman, has assembled some seven papers which, in addition to adequately covering the subject matter, range from a new approach to the design of the electric furnace to the development of the ferro-alloy industry in Australia. Additionally, the papers will cover the design trend of calcium carbide furnaces and a broad approach to the U. S. Bureau of Mines' place in the field of electrothermic developments.

The meeting will include a symposium broadly titled, "Electrochemical Techniques in Metallurgical Research." Dr. J. H. Westbrook has organized this program, which begins Tuesday afternoon. To illustrate the scope of this symposium, a listing of Dr. Westbrook's section titles is given: Oxidation and Corrosion, Thermodynamics, Mechanical Properties, Preparation of High Purity Metals, Metallography, and Atom Movements. Metals or alloys ranging from aluminum and magnesium to uranium and zirconium are treated in approaches which are both theoretical and practical.

SPRAYON "PUSH-BUTTON" TOUCH UP

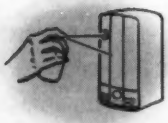
PROVED AND ACCEPTED BY THE LEADERS OF INDUSTRY

USED BY THESE FAMOUS FIRMS

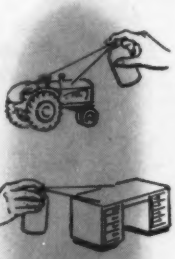
★

Addressograph-Multigraph Corp.
Allis-Chalmers Manufacturing Co.
American Kitchens—Div. of Avco
Art Metal Construction Co.
Automatic Canteen Co.
Bell Telephone Co.
Berger Manufacturing Division, Republic Steel Corp.
J. I. Case Co.
Coca-Cola Bottlers
Crosley—Division of Avco
Delco Products Division, General Motors Corp.
Allen B. DuMont Laboratories, Inc.
Frigidaire Division, General Motors Corp.
General Electric Co.
The General Fireproofing Co.
International Harvester Co.
Jaeger Machine Co.
The Maytag Co.
Metal Office Furniture Co.
Monroe Calculating Machine Co.
Nash-Kelvinator Corp.
National Ventilated Awning Co.
New Holland Machine Co.
Remington Rand, Inc.
F. C. Russell Co.
Scott Atwater Manufacturing Co., Inc.
Troy Sunshade Co.
Westinghouse Electric Corp.
Youngstown Kitchens by Mullins

YOUR OWN FINISH FROM YOUR OWN SOURCE!



Only Sprayon can give you factory quality touch up every time! Adopted by industrial leaders from coast to coast, the custom-loaded Sprayon Self-Spraying Touch Up Tool ends your touch up problems! We go right to your source for your own touch up finish. Exclusive Sprayon design features mean even unskilled help do a factory-perfect job in ***minutes***. Use it anywhere—from your own production line to the final customer. Nothing else to buy—it's a disposable low-cost, constant pressure spray gun—a complete paint shop in a can!



SPRAYON PRODUCTS, INC.
2073 E. 65th ST. • CLEVELAND 3, OHIO

SPRAYON *Self Spraying* TOUCH UP TOOL

WRITE TODAY FOR YOUR FREE "PUSH-BUTTON" FOLDER

42ND ANNUAL CONVENTION AND 4TH INDUSTRIAL FINISHING EXPOSITION, AMERICAN ELECTROPLATERS' SOCIETY, Municipal Auditorium, Cleveland, Ohio, June 20-23, 1955.

Pennsylvania Salt Manufacturing Company has developed a portable Orsat gas analyzer for quickly determining the concentration of hydrogen and chlorine in chlorine gas from electrolytic cells. This equipment will be described.

The reaction between hydrogen and chlorine is initiated by the photochemical activation of the chlorine molecule using a conventional light source. Hydrogen chloride is absorbed and the resulting contraction in volume in the specially designed burette indicates directly the percentage of hydrogen in the sample. The analyzer also determines the concentration of chlorine in the cell gas by subsequent absorption.

A new type of amalgam cell has been developed by Vittorio de Nora of Italy, which utilizes amalgam flowing vertically along a supporting element and which has a diaphragm to separate the cathode compartment from the anode compartment. The main features of this cell will be described.

Current efficiency of the cell is above 96 per cent, and average voltage less than 4.3 at normal load. This compact and efficient cell introduces many interesting features and shows very promising results. It can be built in a wide range of capacities from 3000 to 60,000 amperes and permits saving of floor space.

M. J. UDY is president of the Electrochemical Society, and **DR. HENRY B. LINFORD** is executive secretary. **DR. R. O. McDUFFIE**, Professor of Metallurgical Engineering, University of Cincinnati, is the chairman in charge of arrangements for the Spring Meeting.

Copies of the Spring Meeting Program Booklet, including abstracts of papers to be presented and completed information on all activities, may be obtained from Dr. H. B. Linford, The Electrochemical Society, Inc., 216 W. 102nd St., New York 25, N. Y.

★ ★ ★

Titles of papers scheduled for presentation at the **42ND ANNUAL CONVENTION OF THE AMERICAN ELECTROPLATERS' SOCIETY** have been announced by the convention committee.

Completion of the technical program, to be held in Cleveland, June 20th through 23rd, 1955, has been announced by Eugene L. Combs, general chairman. Mr. Combs reports that the subjects are calculated to cover significant methods for producing better finishes.

Here are tentative titles of the papers:

Liquid Level Control
Recovery of Waste Cyanide Zinc
Plating Powdered Metallurgy Bronze Parts
High Speed Brass Plating

Representatives of the Industrial Finishing Exposition Committee and American Electroplaters' Society in joint planning session.

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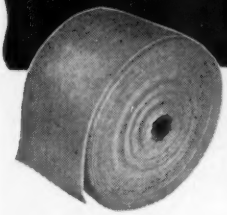

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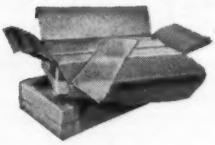

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Electroplating Classes
Tin Plating of Copper Wire
Nickel and Copper Plating on Coils
Copper Plating on Steel for Telephone Drop Wires
Effect of Ripple on Plating
Filtering and Handling of Chromic Acid Solutions
Handling of Waste and Waste Treatment
Finishing and Plating of Beryllium and Beryllium Alloy
Vacuum Metallizing
Anode Current on Phosphatized Copper Anodes
Flow Coating of Paint

THE INDUSTRIAL FINISHING EXPOSITION, to be held concurrently with the technical sessions in Cleveland's Public Hall, will attract about 200 exhibitors of finishing equipment, services and supplies, according to Mr. Combs. Exhibits will occupy both the upper hall and the lower level hall. Two meeting rooms, one on the upper level and another at the lower level, will house the technical sessions.

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ROBERT L. GIESEL, president of Adolph Plating, Inc., and Chairman of the Chicago Electro-Platers Institute, has been presented the annual James M. Yard "Good Neighbor" Award. The presentation was made by John T. Rettaliata, president of the Illinois Institute of Technology. Mr. Giesel was honored with twenty other prominent Chicagoans in ceremonies in the Chicago City Council Chambers.

John T. Rettaliata (left) presents Robert L. Giesel with the James M. Yard "Good Neighbor" Award

★ ★ ★

THE UDYLITE CORPORATION has concluded a 3 day national sales meeting with a banquet at which service awards were presented to 17 employees by Clyde H. Reeme, president.

Ten men received 15 year bronze lapel buttons. Six men received 20 year buttons and gold watches. L. K. Lindahl, chairman of the Board of Directors, received a gold lapel button commemorat-

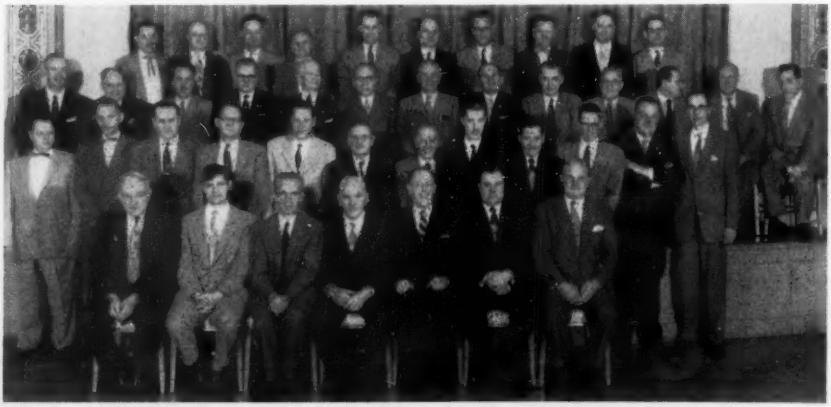

Photo of 42 of the 51 members of the Udylite Service Club

ing his 30 years of Udylite service.

These presentations raised the Udylite Service Club membership to a total of 51, all of whom have served Udylite 15 years or more. The total service represented by the Club members is 935 years.

TRAINING COURSES

The spring sessions of the **BINKS SPRAY PAINTING SCHOOL** will be held Apr. 4 to 8, and May 2 to 6.

Anyone interested in, or connected with, the application of paint and coatings is eligible to attend this free school. Previous experience is not required, but, in the past, most members have been associated with firms or industries which use spray painting equipment.

Included in the one-week course are discussions of such equipment as paint circulating systems, fluid handling pumps, oil and water extractors, flock equipment, compressors and all auxiliary equipment.

Instruction is given by William Beacham, nationally known paint chemist and spray painting authority and director of the Binks Research Department.

Because of the small size of the class, it is important that application for attendance be made as far in advance as possible. This may be done by writing to E. F. Watts, Binks Manufacturing Co., 3118-40 Carroll Ave., Chicago 12, Illinois.

NECROLOGY

LEWIS W. LAMMIMAN, 59, director of technical services for the DeVilbiss Company, Toledo, Ohio, died Feb. 27.

Mr. Lammiman in his post at DeVilbiss directed the activities of customer advisory services on technical matters and the company's spray painting school. He joined DeVilbiss in 1926 as a service engineer and was promoted to director of technical services in 1950. He was recognized as an authority on the solution of production and finishing problems involving paint spray equipment and materials.

★ ★ ★

EMMET D. GRIFFIN, who advanced from the position of accountant with Pittsburgh Plate Glass Company to that of director and vice president of the firm, died March 4 in Pittsburgh, Pa.

Mr. Griffin, age 75, retired as vice president in charge of the paint division during 1952 and as a director of the firm the following year. He joined the company's merchandising division at Cleveland, Ohio, during 1903, later served as manager at Dallas, Houston, Kansas City, and Philadelphia.

meetings OF INTEREST TO FINISHERS

Apr. 5-6. Spring Conference, The International Association of Electrotypers and Stereotypers, The Kentucky Hotel, Louisville, Ky.

Apr. 8. Annual Meeting, Bridgeport Branch, American Electroplaters' Society, Hotel Barnum, Bridgeport, Conn.

Apr. 16. Empire State Regional Meeting, American Electroplaters' Society, Hotel Seneca, Rochester, N. Y.

Apr. 23. Annual Dinner Dance and Educational Session, Indianapolis Branch, American Electroplaters' Society, Indianapolis Athletic Club, Indianapolis, Ind.

Apr. 30. Annual Meeting, Milwaukee Branch, American Electroplaters' Society, Schroeder Hotel, Milwaukee, Wis.

Apr. 30. Annual Meeting, Boston Branch, American Electroplaters' Society, Hotel Statler, Boston, Mass.

May 1-5. 107th Meeting, The Electrochemical Society, Hotel Sheraton-Gibson, Cincinnati, Ohio.

May 7. 37th Annual Banquet and Entertainment, Masters' Electro-Plating Association, Inc., Plaza Hotel, New York City.

May 7. Annual Meeting, Toronto Branch, American Electroplaters' Society, Sheraton-Brock Hotel, Niagara Falls, Ontario.

May 14. 16th Annual New England Regional Meeting, American Electroplaters' Society, Hotel Statler, Hartford, Conn.

June 20-23. 42nd Annual Convention and 4th Industrial Finishing Exposition, American Electroplaters' Society, Municipal Auditorium, Cleveland, Ohio.

June 26-July 1. Annual Meeting, American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.

The Finishing Touch

By J. A. Patterson

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This Opportunity Section is available for classified advertisements. For advertising rates and other information address: PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

ORGANIC SOLVENTS. A handbook on organic solvents may be obtained by a request on company letterhead to **The Solvents and Chemicals Group,** 2540 West Flournoy St., Chicago 12, Ill. Properties of solvents, such as flash point, toxicity, dry time, and solvent power are explained in non technical language. Comparison tables, testing methods, and applications of organic solvents are included in this handy pocket size edition.

★ ★ ★

COATED ABRASIVES HANDBOOK. A 60 page "Production Digest" of authoritative papers on coated abrasive grinding and polishing techniques may be obtained from the **Behr-Manning Corp.,** Dept. PD-54, Troy, N. Y. It has been assembled from 20 technical papers prepared by Behr-Manning methods engineers during the past two years for periodicals of production engineering in both the metalworking and the woodworking fields.

Subjects covered include: coated abrasives theory and practice, contour polishing and grinding, the inside polishing of recesses and small openings, the conversion of polishing jacks to belt usage, contact wheels, part sizing and deburring, swing frame grinding, cylindrical stock grinding, abrasive belt lubrication, disc grinding problems, tolerance grinding of wide sheets, abrasive strapping techniques, special abrasive cloth shapes and their uses, the cutting of spiral-wound abrasive drum covers, the modern use of coated abrasives in finishing, and suggestions on cost cutting in production practice.

★ ★ ★

BARREL FINISHING BOOKLET. A new instructional booklet on barrel finishing is available from the **Minnesota Mining and Manufacturing Co.,** Dept. PF-124, St. Paul 6, Minn.

Called "There's Gold in Them Thar Barrels," the 10-page manual describes the basic steps involved in making trial processing runs, and makes recommendations for selection of media and compounds.

The publication also gives specific recommendations for barrel speeds, water level, time cycles and barrel loading; lists 11 "Honite" brand compounds and the specific uses of each; and explains "self-tumbling" or rolling.

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PRODUCT LITERATURE

44. Metal Cleaner
A leaflet from Bates Soap Co., 1231 Seneca St., Buffalo 10, N. Y., gives typical applications and directions for use in each case for Bates cleaning compounds. These include cleaners for brass and copper, aluminum, zinc, and other materials.

45. Dust Collector
Bulletin 810 gives a description of Hammond Cyclone DusKolectors. Complete specifications and photographs of several models are presented. A capacity chart shows cubic feet of dust that each model handles, and the maximum wheel or belt capacity of each. Write Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Mich.

46. Filtration for Paint Spray Booth Water
Automatic skimming and filtration of water used in water wash spray booths is described in a catalog available from Industrial Filtration Co., 166 Industrial Ave., Lebanon, Ind. The catalog covers the operating principles of the Delpark Industrial Filter, describing and illustrating its application in several plants. This filtration system is particularly adapted to plants in which high production spraying is performed. Continuous filtration of spray booth water keeps paint spray booths operating at peak efficiency.

47. Wet Blast Cabinets.
Outstanding features for Belmont Wet-Blast Cabinets are given in a pamphlet available from the Vacu-Blast Co., Inc., P.O. Box 885-WB, Belmont, Calif. Recommended applications and details for various parts of the machine are included.

48. Automatic Polishing and Buffing Machines.
A catalog available from Acme Manufacturing Co., 1400 E. 9 Mile Rd., Detroit 20, (Ferndale) Mich., shows the company's line of rotary automatic polishing and buffing machines. Details of the various types and sizes of machines are given, with recommendations for their uses. Specifications and accessory equipment for Acme Automatics are also included.

49. Bench Model Tumbling Barrel
The Esbec Universal Model B Tumbling Barrel is described in a bulletin being distributed by the Tumbling Sales & Service Co., King Street, Greenwich, Conn. Structural details and specifications are shown in the bulletin. Constant speed and variable speed machines are available. These barrels are designed for finishing small parts.

50. Abrasive Band Wheels
Information on Even Cut Abrasive Band Wheels is contained in a folder which may be obtained from the Even Cut Abrasive Band Co., 8212 Carnegie Ave., Cleveland 3, Ohio. Complete details are given for all types of band wheels and a variety of abrasive bands.

51. Silicone Paint
An illustrated brochure on Sili-Kool, a heat, rust and corrosion-resistant silicone paint that withstands 1600 deg. F. and exposure to extreme weather conditions, may be obtained from C. H. Dragert Company, Inc., 2518 Chalk Hill Road, P. O. Box 5092-L, Dallas, Texas.

52. Radiant Baking Oven
A booklet being distributed by The Fostoria Pressed Steel Corp., Dept. 222, Fostoria, Ohio, is entitled "How Thousands of Plants Cut Costs." It contains interesting case histories showing applications of Fostoria Radiant Ovens.

53. Portable Platers
Process details and desirable features of Rapid Portable Plating Equipment are shown in a pamphlet which may be obtained from Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago 5, Ill. Photographs of the equipment and typical applications are included.

54. Vapor Degreasing Process and Equipment
Bulletin No. 953-1 describing vapor degreasing, its advantages and the latest equipment available may be obtained from Ramco Equipment Corp., 803 Edgewater Rd., New York 59, N. Y. Also shown in this booklet are several standard Ramco machines, and a partial list of articles which can be cleaned by vapor degreasing.

55. Aerosol Paint
A brochure on aerosol paint is being offered by Sprayon Products, Inc., Cleveland 3, Ohio. The booklet contains answers to questions about self-spraying paints and tips on getting the most out of "push-button painting."

USE CARD FOR FREE LITERATURE

56. Industrial Chemicals
Chemicals manufactured by the Harshaw Chemical Co. are listed alphabetically in a catalog being distributed by the Harshaw Chemical Co., Cleveland 6, Ohio. Chemicals manufactured by Harshaw include plating chemicals and laboratory reagents.

57. Coated Abrasives
Catalog No. 23, available from Abrasive Products, Inc., South Braintree 85, Mass., gives information on coated abrasive papers and cloths, abrasive belts, and specialties manufactured by the company. Complete details and specifications are given for each category of the line.

58. Ultrasonic Washing Units
A leaflet describing ultrasonic washing units for cleaning and degreasing metal parts may be obtained by writing Curtiss-Wright Corporation, Industrial & Scientific Products Div., Caldwell, N. J. Photographs and a list of several models are presented.

59. Electroplating Processes
Hanson-Van Winkle-Munning Co., Matawan, N. J., has available Bulletin PP-100 listing products for electroplating and metal cleaning processes.

Included in the bulletin is a description of ten technical, laboratory, training, and research services.

60. Buffs
Information on Schaffner Bias Buffs is contained in a folder which may be obtained from the Schaffner Manufacturing Co., Inc., Emsworth, Pittsburgh 2, Pa. Data on buffing compounds, rouges, and polishing wheel cements is given.

61. Parts Cleaner
Facts on the Turbo-Blast Parts Cleaner are given in a bulletin obtainable from Storm-Vulcan, Inc., 2225 Burbank St., Dallas, Tex. These cleaners are designed for utilization of small working areas and are available in sizes from 20-gallon capacity to large conveyor-type systems.

62. Finishing Ovens
Bulletin 200, describing Sly Convectioneered Ovens, may be obtained from the W. W. Sly Manufacturing Co., 4784 Train Ave., Cleveland 2, Ohio. This bulletin gives full information on Sly industrial ovens for finishing, baking and drying. Advantages in the use of these ovens are enumerated in the discussion.

63. Buffing Machine.
Details for the Harper Uniflex Buffing Machine are given in a bulletin being distributed by the Harper Buffing Machine Co., Portland, Conn. Advantageous features, construction, and photographs of the machine are included.

64. Porcelain Enamel Pre-Treatment
Information on Parker Pre-Namel 420, a pre-treatment for aluminum surfaces to be porcelain enameled, is contained in a bulletin which may be obtained from the Parker Rust Proof Co., 2172 E. Milwaukee, Detroit 11, Mich.

65. Copper Stripping Solution
Information on McKeon's Liquid Sulphur, which is used in stripping copper and in oxidizing copper and silver, may be obtained from literature being distributed by Sulphur Products, Inc., 228 McKeon Way, Greensburg 6, Pa.

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66. Tungsten Filaments for Vacuum Metallizing
A booklet available from Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N. Y., gives details on tungsten coils for vacuum metallizing. The booklet gives information about and advantages of these tungsten filaments.

67. Dust Collectors
Pertinent details on Dustkop Dust Collectors may be found in descriptive literature available from the Aget Manufacturing Co., 1390 E. Church St., Adrian, Mich. Information on "Cyclone Separation" is given.

68. Yoke Sanders.
Several models of belt grinders are shown in a bulletin available from the Bush Mfg. Co., Clawson, Mich. Photographs and applications are given for several models designed for a variety of uses. Specifications are included.

69. Electroplating With Rhodium
Data on properties and applications of rhodium plate is found in a booklet being distributed by Baker & Co., Inc., 113 Astor St., Newark 5, N. J.

70. Epon Coatings
Full information on Epon coatings is contained in a booklet obtainable from the Shell Chemical Corporation, 380 Madison Ave., New York, N. Y. Entitled "Planning to Paint a Pyramid?", it contains interesting data on these coatings, which are noted for resistance to moisture, heat and corrosives.

71. Barrel Plating Equipment
A catalog sheet available from Lasalco, Inc., 2820 Lasalle St., St. Louis 4, Mo., gives information on transparent plastic plating cylinders and Richards Barrel Plating Equipment.

72. Tumbling Abrasive
Form ESA-236, issued by Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa., describes Borolon Tumbling Abrasives. Composed of aluminum oxide lumps and grain, these abrasives are used to barrel finish a wide variety of metal parts.

73. Selenium Rectifiers
A catalog being distributed by the Rapid Electric Co., 2877 Middletown Rd., New York 61, N. Y., describes and gives specifications for rectifiers built for laboratory and industrial use.

74. Flock.
The use of Cellusuede Flock in finishing is discussed in a booklet being distributed by Cellusuede Products, Inc., 500 N. Madison St., Rockford, Ill. Uses, selection of adhesives, available colors, application methods, and properties are covered. Cotton and viscose rayon flock are compared as to properties and durability in a chart.

75. Vapor Degreasing
A booklet entitled, "What You Should Know About Vapor Degreasing," may be obtained from Metalwash Machinery Corp., 915 North Ave., Elizabeth 4, N. J. This literature describes the solvent cycle, several types of vapor degreasers, and the Metalwash Hydraulic Lifter for batch type degreasers.

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